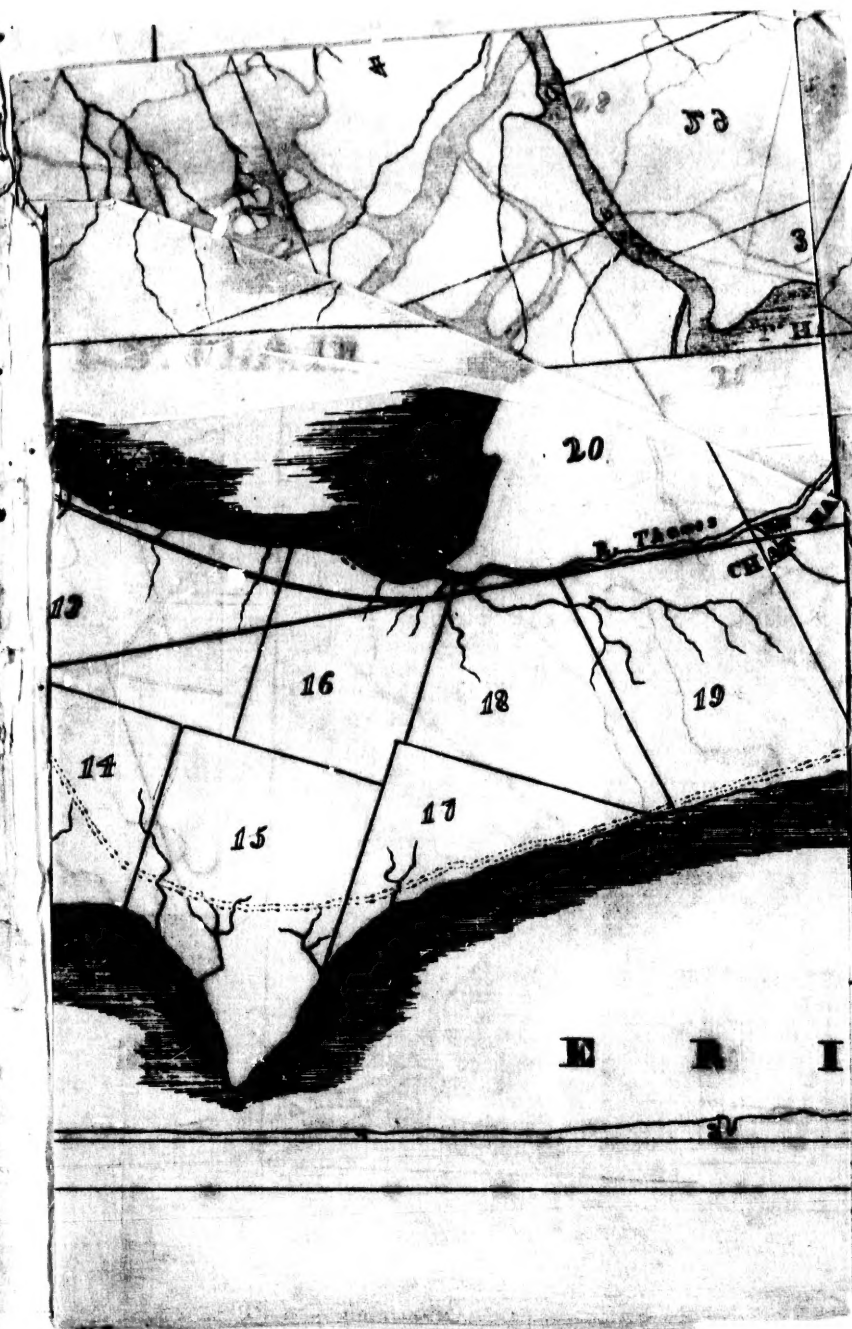


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REPORT OF THE ENGINEER
ON THE
NIAGARA & DETROIT RIVERS
RAIL ROAD.

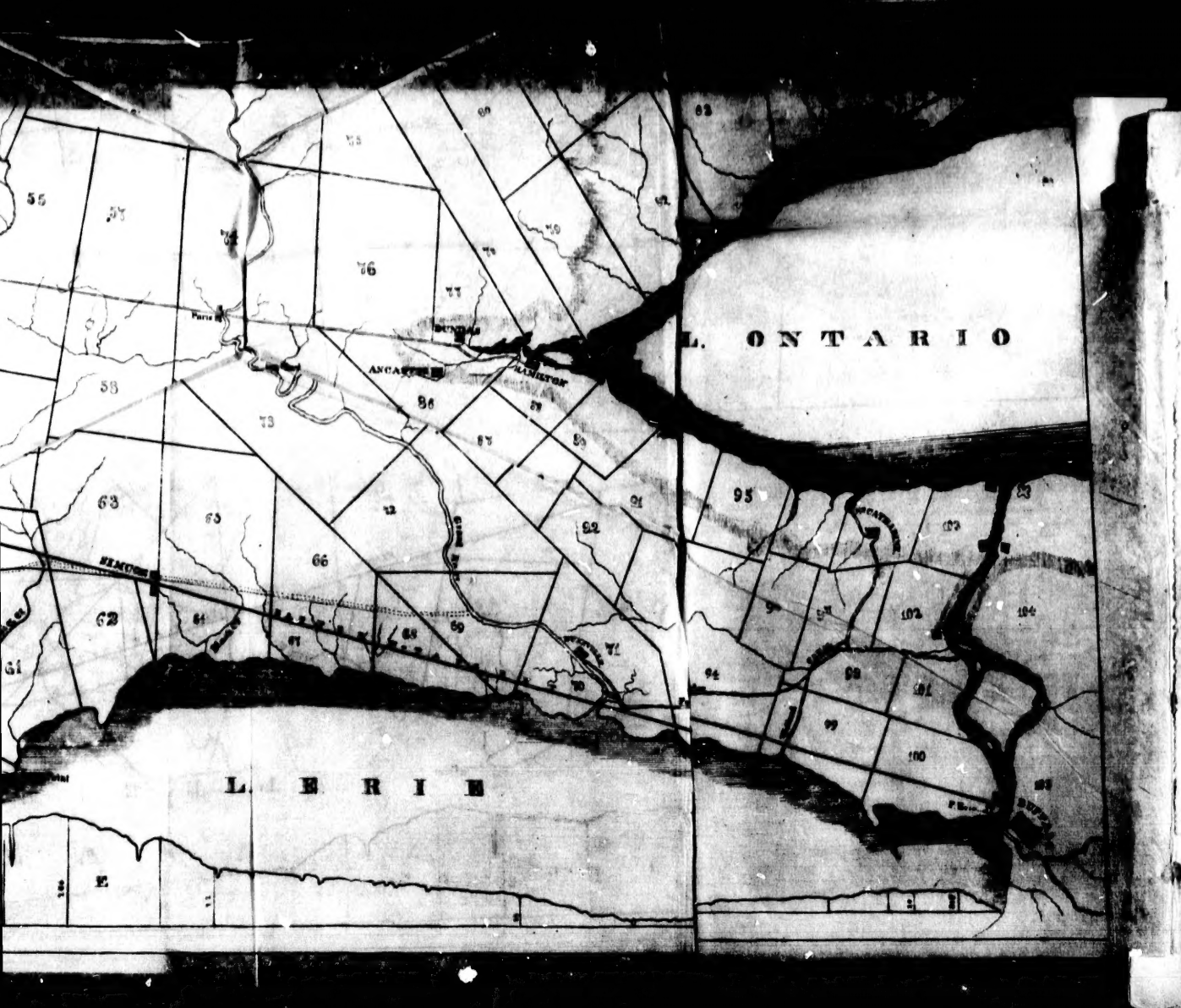


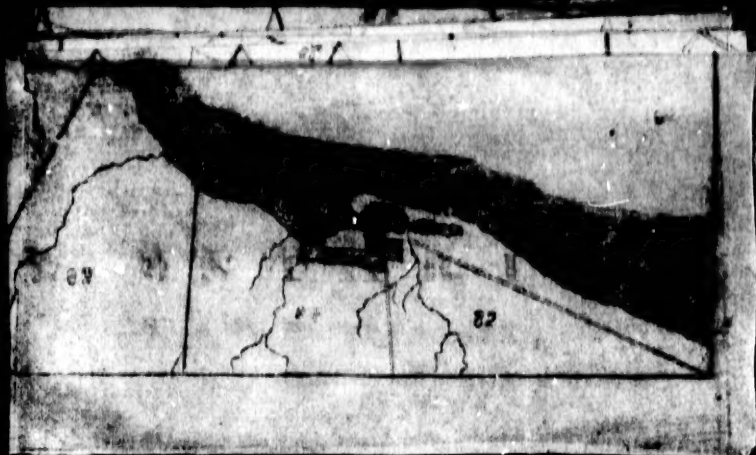






**A
MAP
AND
PROFILE
OF THE
DETROIT RIVER
RAILROAD**
SCALE
1 MILE = 1 INCH
VERTICAL SCALE 1 INCH = 10 FEET

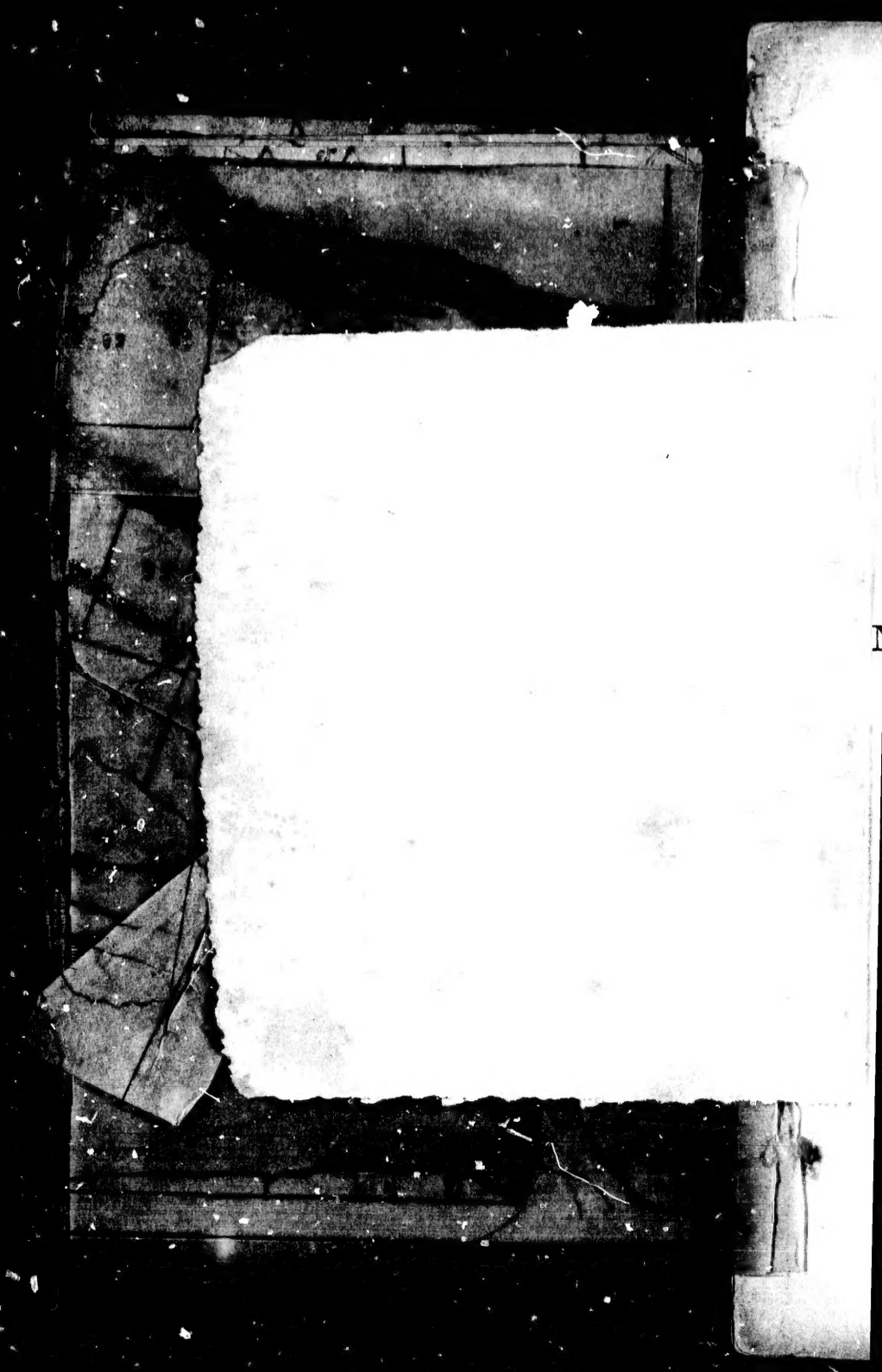




REPORT OF THE ENGINEER

EXPLANATION OF MAP.

1	Ingham County	36	Williams,	71	} Reservation,
2	Oakland "	37	Mosa,	72	
3	} Macomb "	38	Elefrid,	73	
4		39	Caradoc,	74	Dumfries,
5	St. Clair "	40	Lobo,	75	Puslinch,
6	Washtenaw "	41	Delaware,	76	Beverly,
7	Wayne "	42	Aldboro,	77	West Hamboro,
8	Monroe "	43	Dunwich,	78	East Hamboro,
9	Sandwich	44	Southwold,	79	Nelson,
10	Reservation,	45	Yarmouth,	80	Nassagawego,
11	Malden,	46	Westminster,	81	Esquesing,
12	Colchester,	47	London,	82	Trafalgar,
13	} Maidstone & Rochester,	48	Nissouri,	83	Toronto,
14		Gosfield,	49	Dorchester,	84
15	Mersea,	50	Malahide,	85	Scarborough,
16	West Tilbury,	51	Bayham,	86	Ancaster,
17	Romney,	52	Dereham,	87	Clamford,
18	East Tilbury,	53	Oxford,	88	Barton,
19	Raleigh,	54	Blanford,	89	Saltfleet,
20	Dover,	55	Zorra,	90	Brinbrook,
21	Chatham,	56	Wilmot,	91	Grimsby,
22	Harwick,	57	Blenheim,	92	Caistor,
23	Howard,	58	Burford,	93	Gainsboro,
24	Orford,	59	Norwich,	94	Wainfleet.
25	West Camden,	60	Middletown,	95	Clinton,
26	Zone,	61	Walsingham,	96	Pelham,
27	Dawn,	62	Charlottville,	97	Thorold,
28	Sombre,	63	Windham,	98	Crowland,
29	Moore,	64	Woodhouse,	99	Humberstone,
30	Enniskillen,	65	Townsend,	100	Berthier,
31	Broake,	66	} Walpole,	101	Longley,
32	Warwick,	67		68	102
33	Plympton,	69	Rainham,	103	Niagara,
34	Sarnia,	70	} Reservation,	104	Niagara County
35	Adelaide.			70	105



REPORT OF THE ENGINEER

UPON THE

PRELIMINARY SURVEYS

FOR THE

NIAGARA & DETROIT RIVERS

RAIL ROAD,

WITH A

MAP, PROFILE, AND PLAN OF CONSTRUCTION.

MAY, 1837.

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(6 1/2)

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R E P O R T.

*To the President and Directors of the Niagara and Detroit
Rivers Rail Road Company.*

GENTLEMEN,—In making a report, as your Engineer, I would first ask your attention to the ample provisions of your charter which accompanies this report. This provides for the construction of a Rail Road from the town of Burtie to the town of Sandwich, with very favorable provisions in the details of the charter. By an act passed in March, 1834, a charter for a Rail Road from Hamilton or Burlington Bay, to London, and from London, to the navigable waters of the River Thames, and to Lake Huron, was granted. On the last mentioned road, I had the honor to make a survey and report, voluminous in their details, with a view, on the part of the company, to amend their charter, and to present to the Government facts and reasons to induce them to aid the work.

During the progress of Parliamentary enactments, connected with that survey, I have further had the honor to be selected by you, to make a survey under the provisions of your charter; and the work has been in progress during the sittings of your Parliament. At the period of making this report, Government have completed their enactments, and extended liberal aid for the promotion of Internal Improvements in the Province. They have amended the charter of the London and Gore Rail Road, and under the title of "The Great Western Rail Road Company," authorised negotiations with your company, under certain provisions; and the issuing of Debentures in aid of their work, confining their appro-

priations to the distance between Hamilton and Woodstock, and providing for the final location of its western termination, by Engineers to be appointed by the Governor—thus giving it the character of a public road for the promotion of general Provincial interests, and of course expecting its location will be such as will best promote that interest, and attract commerce and intercourse most extensively to her capital and commercial cities.

This is a subject of great importance, and will address the hopes and feelings of many with considerable effect. The location of roads through a vast extent of fertile country, connecting all its population, business and intercourse in the most favorable general arrangement, is one of difficulty and of great importance.

The foregoing details of facts may be thought, by some, to constitute serious impediments to a faithful performance, on my part, of the duties of your Engineer. To me it seems otherwise. It is impossible for the information of an Engineer, on all subjects relative to the topography of the country, in the neighborhood of which his professional labors are engaged; of its population, their wants and wishes; of its means, resources, plans, purposes, improvements, connexions, and means of intercourse, to be too extensive. If he be a man of probity, experience, and skill, the more he has of such information the better; for it will enable him, with greater success, to adapt his services and recommendations to the profit of any work with which he may be charged. The exertions I have been called to make in the Province, have brought me into useful communication with many of her worthy inhabitants, afforded me opportunities of understanding her soil, her timber, her streams, her minerals, her settlements, her agricultural, commercial, and manufacturing facilities, and her actual intercourse and means of prospective advancement, better than I could otherwise have done without much longer inquiry. And I am conscious of very strong convictions in favor of the importance of prosecuting Internal Improvements in the Province, with the greatest vigor, upon a scale so large as to embrace the interests of all.

It ought not to be expected of an Engineer, that he should be so absorbed, by devotion to any sectional interest, as to be insensible of the value of other interests, and the power by which they are likely to be advanced. Such an absorption would subject him to errors equally disreputable to him, and injurious to his employers. Exempt himself from the bias of special pecuniary interest, in the result, the elevation of his views, and the comprehension of his knowledge, guided by long experience and habitual meditation, upon such subjects, ought to enable him to judge more safely than others, for the interest of the Stockholders. He should certainly be cautious of giving hasty and inconsiderate opinions; but when properly called upon to express his views, should be prepared to present facts and plans collected and matured, with all the industry and ability of which he is master, and combined under a deep sense of all the objects of his trust. In his recommendations, all the capitalists, who make investments in the work, to which they refer, are interested to hold him, and they should hold him, to no slight accountability.

The object of your company is great, in all its bearings, and I am satisfied, is entirely feasible, and you expect much from a professional report upon it. This expectation is natural and reasonable; but it cannot be met without fearful responsibility, on the part of your Engineer. A preliminary survey, carried on with rapidity and under disadvantageous circumstances, through a country presenting a wide extent of wilderness compared with settled portions, to elucidate a vast plan of improvement, in which every settlement already formed feels a lively concern, and every new-comer finds the principal motive to determine his individual residence, involves in every step of the progress, much care and anxiety, and these are rendered still more grave, when the survey is looked to, for eliciting facts, and suggesting plans, which shall lead to large investments of money for stock, already in part subscribed for, and for opening such expansive means and facilities of internal communication, as will strikingly advance private interest, and the general prosperity. Under such cir-

cumstances, it is due to those interested in the survey, on either side of the proposed lines, as well as to myself, to say, that I have been compelled to confine my instrumental examination to a single line. This compulsion has been the result of limited appropriations to meet expense, and the shortness of the time, after the survey was commenced, before uncontrollable impediments would arise from the approach of Spring.

The provisions of the charter authorize the adoption of the shortest and best route, throughout the whole line, which the country between the extremities will admit, prescribing no intermediate places as indispensable points of contact; and the settlements and business of the country affected by the location, are in no way empowered to discourage or influence the selection of the best plan of proceeding. This is of much importance, as it leaves the Engineer to the unembarrassed control of his judgment in determining the location, at all points.

It is obvious, that the shortest practicable route should always be preferred, where equal facilities of construction and accommodations to business, are offered. Otherwise, needless cost is encountered, in the first construction, for no other purpose but to ensure needless expense of annual repair, and some gratuitous labor of traction at every trip. The same remarks apply to all unnecessary ascent and descent, in the grade line. In the use of a Rail Road between any two leading points, it is always presumed, the proprietors will charge the greatest amount they can expect to obtain, in competing with other lines of passage. All extra expense of outlay must, therefore, operate as sheer loss to them.

Enterprising individuals project plans of improvement, and apply to the competent authorities for chartered rights. The Parliament, receiving such applications, are often uninformed of the merits of the work in question, and its bearings upon the best plan of internal policy. In such cases, an Engineer may be employed to subserve views and promote schemes, which are inexpedient or impracticable; and he may not know that they are so, until long continued actual examination.

The examinations for your work have been undertaken,

and conducted, without any other views, than to ascertain the best practicable route and to devise the best plans of proceeding in its construction. In schemes of great magnitude and expense, sensible men will take care to rely upon no loose speculations, or merely conjectural data, but will found their investments and expectations solely upon the results of sober thought, and the application of scientific principles. They will be governed by their anticipations of pecuniary consequences to themselves and their children, and of probable advantages to their country.

In this age of extensive observation, and bold projects for internal improvement, your road will attract the approbation of intelligent men, and the confidence of capitalists, as a measure of extraordinary facility of execution, in proportion to its extent, and of wise adaptation to the natural and artificial features of the vast and very thriving regions, with which it will be connected. It is shown to be highly worthy of being vigorously prosecuted, by every consideration of its local details, and ensured of abundant remuneration, by the soundest estimate of the various and extensive business it will command.

Too much care, in the collection and comparison of facts, affecting the location, security, resources, future business, and natural advantages of a new region, through which a great avenue of communication is to be constructed, can scarcely be taken, before the work is commenced. A proper care in these relations, demands, that whatever influences private and public interests in the immediate vicinity, in important points throughout the entire Province, and in the wide range of neighboring territories, from which travel and transport may be derived, should enter into the consideration of the Engineer, and properly qualify his whole course of decisions. Portions of your line must closely approach, and run parallel with steam navigation, while other large portions lying farther inland, need fear no competition, as the tracts which they traverse must exclusively depend upon your work for facilities of communication.

The inducements to construct the road, which constitute the subject of this report, are such as belong to the country

through which it is to run, and such as are connected with the neighboring states and territories, which should be duly considered by the Engineer in the plan and views of location. The chief motive to such works by incorporated companies, are founded in the profits expected. These may arise from the receipts of the road directly, or indirectly from the influence of the road upon property of the stockholders lying in the vicinity.

Besides other indirect advantages to be derived from constructing your road, and which are generally understood, a less obvious but very important one, affecting the health of the adjacent country and the value of lands, will be experienced in the drainage it will effect. In the progress of making the road, great care must be taken to conduct the surplus waters, which it crosses, into natural channels for their discharge. This will in your case reclaim to the most profitable cultivation, large tracts of great fertility now too wet for the purposes of husbandry.

The direct profits will depend upon the extent of its use, and that again upon the condition and wants of the entire region, which it will accommodate. Your road will offer important facilities to large portions of the United States. From these, therefore, you will expect a great share of the remuneration, which is to reward your enterprise, and the plan of location, in that case, may vary to command sectional divisions of that territory.

The shrewd, watchful and active inhabitants of the United States adjacent to your Province, or at least within the reach of the attraction of your road, are projecting improvements in all directions, and are thriving and multiplying rapidly, under the burthens of an out-lay for roads and canals, beyond all former precedent. In past times, the world has never witnessed such facilities of intercourse, as now, every where, awaits the use of man. This is partly the effect, and partly the cause, of a universal activity so animated as almost to make nations giddy.

The spirit of these improvements has been most efficaciously developed in New York, which has already opened very easy

channels of intercourse from all her most important positions to your borders. In her train, New England on the east, and Pennsylvania and Ohio on the south, have followed with energetic emulation. And the new states of Michigan, Indiana and Illinois, with the territory of Wisconsin, all increasing as by enchantment, are pursuing a policy which cannot fail to connect the south-west and west with your Provincial improvements by numerous and profitable reciprocations of business and intercourse.

If we explore a little more minutely the nearest sections of this vast field of republican enterprise, we see Rail Roads projected, and some of them in the course of construction, from the principal points of business lying between Sandusky Bay and the outlet of Lake Huron, across the States of Ohio and Michigan, to the interior and Lake of that name, and connected with similar projects, some of which extend to the mouth of the Mississippi, and others to the far west. It is true, these avenues will not all, as a matter of necessity, send the throngs with which they will in future be peopled, to pass along the southern part of your Province. But with reasonable efforts, and judicious arrangements, an invitation may be extended to them which will infallibly call many of them into that course which should come under the observation of the Engineer in the plans and suggestions he has to offer. Extensive business from all the regions westerly and south-westerly from you will always be maintained with New England, and the city of New York, the great metropolis of the Union. Your road will most conveniently favor much of the travel growing out of this business, at all times, after it shall be completed. During portions of every year, it will favor more of it. It will be shorter and cheaper than any road which can be constructed through Ohio, to the roads leading to New York or further east. It is now ascertained by experience, that locomotives may be well employed, in the winter, on Rail Roads, notwithstanding the severe frosts and deep snows of that season. This will call for extended use of your road, while navigation is impracticable. The exigencies of extensive commercial transactions, along the immense line of

interior navigation, require, in exchanges, remittances, and other communications, frequent intercourse after the close of navigation, in the fall. This is increased by arrangements preparatory to the next season, and the proper closing up of large accounts for the past. The pressure of the very heavy business referred to, during all the season of navigation, leads to deferring to the greater leisure of winter, whatever may as well be done then. From all which, inferences may reasonably be drawn in favor of your undertaking.

The greater the distance to which business is conducted in the interior from the seats of commerce, the more important it is to provide, at all times, the best possible means of communication. If a road north of Lake Erie can be made, requiring but one half the cost of construction and one half the power of traction, and be at the same time shorter than one on the south side, it will naturally be most successful in its competition for business. The greater rapidity of passage, and the certainty of the time for effecting it, with superior safety on such a road, than can be attained in any mode upon the water, will give it advantages, for many purposes, over steam-boat passage on the Lake.

The improvements made and in contemplation, from all the growing settlements on the western waters of Lake Erie, and up the river to Lake Huron, as well as those further south and east, are owing to the calculation of self-interest. Enlightened self-interest, in your Province, may certainly strike out and accomplish analogous plans to connect in such a manner with many of those, as to ensure advantageous returns. They must pass through your Province in all their intercourse with the Atlantic.

There are some general considerations, which may hereafter modify your views so materially as to render it imprudent to overlook them now. Permit me to suggest some of them in this connexion.

The details of this report are exceedingly favorable; and to minds delighting in the contemplation of projects embracing a large circle of useful results, they are calculated to inspire the resolution, that the whole work shall be immediately

accomplished. But no work of such various and extensive bearings, and requiring so much fiscal ability, can be perfected without all danger of miscarriage and wary apprehension, and grave consideration should enter into every measure for its advancement. Undertakings the most promising are sometimes lost by unexpected events, and by not being well digested in accordance with existing circumstances.

It is obvious, that the public mind is every where overrunning with schemes of internal improvement. Of these schemes, many will be executed, and many will fail, and those which shall be executed, will not, in all cases, be the best. More capital is wanted than can, in these times, be obtained for all the wise schemes. The consequence will be competitions, jealousies, and negotiations, in which address, ability, and perseverance, will often defeat integrity and a good cause. Capitalists are apt to be cautious. They witness the failure of many wild schemes, and distrust their own judgment, in respect to all improvements recommended, far from the great cities, in which they commonly reside. These motives of caution, strongly impress them, in addition to the risks usually connected with important trusts, and growing out of fraud, incompetence, and the misfortunes of life. Through these motives, and exercising but little personal enterprise, such men are apt to prefer what they consider safer investments in the cities where they live, with less profit, to investments represented to be much more promising, but much more out of their knowledge, and beyond their habitual inspection.

But a small proportion of your stock is yet taken up, although very liberally by the few that have subscribed. The laws of the Province patronise other valuable schemes of improvement; and contemplate the contingency of future amicable and satisfactory connexions between your work and others, not less strongly cherished by influential and well informed gentlemen. And such connexions seem to be the less improbable, from the difficulties of enlisting capital adequate to the speedy accomplishment of many great works in the Province; from the variety and number of the projects of a similar kind embraced by different portions of your colonial

public opinion ; from the obvious interest of the colony, to take such measures speedily, and prosecute them resolutely, as shall offer the most successful competition with what may be deemed rival schemes, now ardently pressing to maturity, in the States ; and from new features, which may be soon produced, by the spreading—ever active—and creative spirit of new settlements, already permanently planted, both in the states, and your own dominions, lying west and north-west of the territory more immediately embraced in your purpose.

As the civil and pecuniary interests of the Province are advanced, new occasions and motives will call larger numbers from many points situated near the Detroit river, to more frequent intercourse with the capital. A connexion opened from some proper point to facilitate this intercourse, may reasonably be included in your colonial policy.

It is designed to extend roads from the interior of your peninsula to Lake Huron. This will foster and swell your own population, in that quarter, and this population, with the larger multitudes inhabiting the northern half of the state of Michigan, will rapidly extend the navigation of the same waters, and fill new calls to a passage over them. Coming from the east, and disposed to maintain, forever, many interesting connexions of business and affection with the east, this population will send a stream of travelers, continually enlarging, from the shores of that Lake to Albany, New York, and New England. Many of these travelers would be glad to pass through the heart of your Province, leaving profitable witness of their route, either by way of Hamilton, Toronto, and Oswego, or farther south by lines connected with this survey and leading through Buffalo.

These views may seem too wide and remote to occupy the minds of some gentlemen engaged in particular improvements. They will probably be entertained by the government, and the most intelligent members of Parliament, and if public patronage is needed, or hereafter to be sought in aid of your enterprise, or any similar one, they cannot judiciously be disregarded.

The country to be traversed by your road, on which the

location is to be situated, is a belt from five to twenty miles wide, except at or near the terminating points, extending from Niagara to Detroit rivers, along the north shore of Lake Erie. This belt is bounded on the north by the river Thames—a range of high lands stretching from Westminster easterly beyond Norwich—and the Welland River. From the Niagara westerly the most favorable location is found in a direct line near the lakes. To this line our work is confined, by extensive low lands and swamps, further north, discharging into Welland river. It is expedient to avoid the southerly bend of of the Welland Canal feeder, which requires passing along the south side of Broad Creek, both of which objects may be answered, by a continuation, on favorable ground, of the same direct line to Grand River and far beyond. This location is very fortunate, in all respects, as the surface which it occupies is unbroken by water courses, and rises but little above the Lake level. From Black Creek to Patterson's Creek, there is but one direction, in which an uniform and easy grade can be secured, in rising from a lower to a higher table of country. And this direction falls in with a continuation further westward of the same straight line with which we commenced. From Grand River to Black Creek, the table lands are every where of easy passage. But the valley of this Creek, as well as that of Patterson's Creek, present increasing difficulties, at every point, approaching the Lake, which, with the projection of a high ridge from the north as far down as the village of Simco, designate that as the most eligible, for the location of our line. From Simco westward, the general elevation of the country is two hundred feet above the lake level; and the streams by which it is intersected, plow it into ravines, deep, wide, with abrupt banks, in proportion to the length of their progress from their sources. Besides, the drainage of the country, in this section, originates longer water courses than exist elsewhere on the route, in consequence of the greater space between the various points of its discharge, into the Thames, Grand River, and the Lake respectively. These circumstances result in offering diminished difficulties, on a route further from the Lake shore. On such a route the difficulties

may be confined to the crossing of Big Creek, Otter Creek, and Kettle Creek, which draw their supplies from a higher range of country lying in between the Thames and Grand River. This presents the possibility of finding a line further north, but north of the line as shown upon the map, higher land makes down between the streams, creating an increase of summit, and producing inequalities of surface much more unfavorable.

On the Otter creek, from the proposed line southerly to the lake, greater difficulties present. The surface is diversified by numerous ridges and ravines, bold and deep, many of them lying at an angle of ascent vertically of 30 deg. The soil is sand and clay, greatly indurated, and covered by extensive forests of pine. On the south of the proposed line, lie Yarmouth heights, between the Catfish Creek and Kettle Creek, along the line of Talbot street. These heights will require the curve which must be adopted in pursuing our course westerly, to be established in the vicinity of Kettle Creek; where the final arrangement of the curve, and connection of the tangents, cannot be judiciously determined, without extensive and careful surveys. The valley of this creek, offers difficulties not to be encountered below St. Thomas.

From St. Thomas westerly, the high levels of sand formation continue in a narrow belt terminating at the O. At this point and farther along the Lake shore, the waters of the Lake have evidently encroached upon, and worn away, the dividing ridge, from which the drainage passes northerly into the Thames. This tract is broken by numerous short and deep ravines, and intersected by small ridges of sand in a part of its surface, making it unfavorable, and in places impracticable to locate a line upon it. Between this and the Thames the land is lower and of a more favorable description. Portions of it in the vicinity of the dividing ridge are encumbered by swamps, but nearer the river, and yet above the short ravines extending southerly from it, is a very favorable line of country, the soil being clay covered with oak, maple, black walnut, and other varieties of timber, and gradually descending toward the west, to a low level occupying the whole distance between

the Lake shore and the Thames. West of the O and Chatham, the same level without ravines or undulations continues to the Detroit river.

The settlements on the lake shore have been fostered and will continue to rely chiefly upon the commerce of the lake. They will be somewhat affected by the location of your road, but much more concerned to encourage facilities of communication extending at right angles across it, from their own doors to the interior. By these alone will interior productions come down to them, and the demands of the country for merchandise, salt, and other articles from abroad, be made conducive to the increase of their trade and wealth. But there are several important settlements more inland, which cannot fail to be greatly, and most of them, beneficially interested in your enterprise. Simco, situated in what has been long known as the Long Point Settlement, is now designated as the centre of a new district, and growing in importance. St. Thomas, a flourishing village upon Kettle Creek, at the crossing of Talbot street, Chatham, occupies a point of much promise at the head of steam navigation on the Thames, and is putting forth laudable efforts to call out all of the advantages of her position. Dunville, on the Grand river, at the point where the Welland canal intersects it, is secure of a rapid augmentation of population and business. The water power produced here, by the dam erected for feeding the canal, with the navigation of the river above and below it, and of the canal itself into lake Ontario, and by means of the Chippawa river, into the Niagara, make its advantages conspicuous. Already it has become the site of extensive lumber establishments; which are beginning to turn to good account the valuable forests extending far and wide within its reach. The demands for lumber are greatly increasing upon lakes Erie and Ontario; and the ease with which saw logs may be brought to Dunville from large and unculled regions, and after being manufactured there, shipped at the mills, for either a southern or northern market will first call into activity large amounts of capital and enterprise at this point; and they will be augmented by every opening of the adjacent country to other branches of productive

labor, and by a growing commerce with the Lakes in other articles.

The residue of the belt, being a great proportion of its entire extent, is yet so little settled and known, as to leave important positions for towns, (between the Grand River and Chatham particularly, on the proposed line of road) to be determined chiefly by your road, and future improvements to connect with it.

It will be perceived, by the foregoing description, and the Map herein referred to, that the most favorable location of your road, will give it an extraordinary character. The physical condition of the country, the position of its leading settlements, and the largest accommodation of rich agricultural tracts, all conspire to point out a route from the Niagara to Detroit Rivers to consist of two tangent lines, each over one hundred miles long, and connected in the centre, by a curve so gradual as not to be distinguishable from a straight line, in short distances, by the eye! The formation of the country is peculiarly favorable for a Rail Road; the surface being level or uniformly ascending and descending in such a manner as to admit every where of easy grades.

The principal difficulties will be encountered at five places on the line, to wit, at Grand River, Patterson's Creek, Big Creek, Otter Creek, and Kettle Creek, and none of these are very formidable! The first, will require a draw bridge and an embankment under favorable circumstances; the second an extra amount of both deep cutting and embankment, and culvert, at Patterson's Creek. The other three streams are proposed to be crossed by bridges, after the form of Long's or Town's, enclosed with a double track supported by timber piers from the bottom. These piers are to be covered for half their height, with cones of earth brought on the road and dropped around their base, the upper portions enclosed in connection with the main trunk. The object of this is to strengthen the piers, and preserve the timber from decay below the earth, to serve as a foundation, when a re-construction shall be required. These bridges will be about 1000 feet in length each, and 80 feet

above the stream. Their cost will be found stated in the estimate.

The extraordinary lengths of straight line on your road are attainable with little or no extra expense, and are unparalleled in the history of similar improvements. And they are the more remarkable as the line crosses the whole drainage of the country at right angles. These desirable distinctions of your undertaking do not depend upon conjecture, but from an actual survey of the whole route, and a level carried through it, except a small portion of the west end, where the land rises but slightly above the adjacent waters, and where the line may be run in any direction best comporting with the policy of the company.

So far as my survey is necessarily connected with the decisions of the commissioners, by their resolution adopted in March last, at the town of St. Thomas, I see no difficulty in the proposed terminating point on the Niagara; and would establish the other termination at the wharf and landing of John Prince, Esq., in the town of Sandwich.

To establish any portion of the route, definitively, by a preliminary survey, cannot be expected, nor is it practicable with a just regard to prudence. The best final designation may be effected, by such variations of the ends of the tangent lines and the curves connecting them, as more minute and detailed examinations shall serve to recommend: and such examinations cannot be duly made without much scientific and vigilant application with transit instruments, in establishing correct lines, and corresponding expense.

The desire to adopt the greatest extent of straight lines, and the easiest curves attainable, may be deemed needless. Experienced men seek for them with great solicitude; and for their sake will incur large extra expense. They are the shortest line possible, and may serve to telegraph from each station house through the line; they promote the safety of rapid motion, in the heavy locomotives employed upon them; they give reputation to the work in which they appear; they offer more attractions in favor of profitable connecting improvements; and of course hold out stronger inducements to

the investments of capital. These considerations, in addition to those herein before adduced in their favor, make it the duty of the Engineer to adopt them if he can without exorbitant extra expense.

The line of location to commence on the Niagara river at a point convenient for ferriage—convenient for constructing suitable wharves; and where it will be found practicable to make eligible purchases of a site for the termination of the road line. Thence south westerly, on a curve of ten thousand feet radius, two miles nineteen chains and eighty-two links, to a point most favorable for the commencement of the tangent lines on the Garrison reservation, known as the site of Fort Erie. Thence on a course supposed to be south, 85 deg. 45 min., west 108 miles 9 chains, to a point believed the most favorable for the commencement of a curve of one hundred thousand feet radius. Thence on the arc of said curve (the angle of the tangent being 20 deg. 30 min.) 7 miles 68 chains. Thence on what is denominated the western tangent, south 62 deg., west 68 miles 13 chains, to what is denominated the St. Clair curve, commencing opposite the mouth of the Thames river. Thence on the arc of said curve, being 100,000 feet radii, the angle of the tangents being 33 deg. 45 min., 11 miles 12 chains 48 links, to the St. Clair tangent. Thence on said tangent 19 miles 3 chains 84 links, to the Detroit river curve, the radius of which is 20,000 feet. Thence on the arc of said curve, 4 miles 18 chains 48 links, to the wharf of John Prince, Esquire, in the village and town of Sandwich. The the total distance is as follows, to wit:

	M.	Ch.	L.
Niagara river curve, 10,000 feet radii,	2	19	82
Eastern tangent,	-	-	-
Yarmouth curve,	108	9	-
On western tangent,	-	7	66
St. Clair curve,	68	61	38
St. Clair tangent,	11	12	48
Detroit river curve,	19	39	84
	4	18	48

Miles 221 69 Chains.

Gosfield route, continuing down the western tangent 89 miles 73 chains, to the curve denominated the Gosfield curve. Thence on the arc of said curve, the radius of which is

10,000 feet, angle of tangent 63 deg. 15 min. 2 miles 6 chains 61 links. Then on what is denominated the Sandwich tangent, 14 miles 60 chains, to the wharf before mentioned in the town of Sandwich. Total distance by Gosfield, 225 miles 44 chains 82 links.

The distance from Niagara river to Detroit river at Amherstburgh, is as follows, to wit :

	<i>M.</i>	<i>Ch.</i>	<i>L.</i>
Niagara curve, - - - - -	2	19	82
Eastern tangent, - - - - -	108	9	00
Yarmouth curve, - - - - -	7	68	00
Western tangent, - - - - -	107	61	25

Miles 225 78 07

The said general description to allow any such changes of said tangents and curves as shall in a final survey be found best or most advantageous. The eastern tangent may be subject to fractional variations from one favorable point of location to another, particularly the location of the viaducts.

The charter does not anticipate a location of the line to Amherstburgh, a reference to which may be considered in the design, but to reach Sandwich requires a deflection from the tangent southerly as it approaches Lake St Clair, and its continuance along the border of the Lake and Detroit River, to its point of termination. This would be shorter 4 miles 9 chains 25 links, than a continuation of the tangent to the corner of Gosfield, and thus giving it a direction to Sandwich. It may be thought expedient hereafter, with a view to claim the business and travel from the shore of Lake Erie, from Sandusky Bay to Detroit River, to obtain authority and complete the tangent to Amherstburgh. A reference to this would influence the location to Sandwich, so as to carry it direct to a point equidistant from this place and Amherstburgh. Should it be found for the interest of the Company to obtain the alteration alluded to, this location would save the construction of a great length of collateral lines.

Before introducing the estimates of your work, I have inserted a copy of my plan and views of constructing Rail Roads, which is the basis on which the estimates are made, and to which I would call your attention.

Rail Roads are constructed in various forms. Much science and ingenuity have been applied to this subject, as well as to all the machinery to be employed upon them.

The relative value of all the forms adopted, is well understood by professional men. Those now interested in the construction of Rail Roads enjoy the advantages derived from their experience and may therefore more safely proceed in this species of public enterprise. It is the part of practical wisdom, in every undertaking, to adopt its exertions to circumstances. In new districts of country, where timber is abundant, the soil rich and deep, and secondary formation; where capital is scarce, and the rate of interest high, prudence dictates the adoption of different methods from those that may be most suitable under different conditions. I have compared all the forms of construction, which have come to my knowledge. After diligent inquiry, with much solicitude, in reference to the cardinal points of economy in their construction, durability and efficiency, I have adopted, as the Engineer of the Tonawanda Rail Road, one of the following description, which is now in use, with locomotive Engines of a heavy class and full freighted trains. The experience of two winters of great severity, confirms the claims here set forth, and its entire efficiency and tendency to keep in perfect adjustment, without the usual annual repairs.

1st. Blocks of round timber, from 18 to 24 inches in diameter, sawed with parallel ends, at right angles with their length, are placed in an upright position, with one end resting firmly on solid earth, from which all roots and top-soil are carefully removed. Of these blocks there are two lines, 5 feet apart, from centre to centre, across the road. These blocks will vary in length according to the surface of the ground compared with the grade level.

2d. Timbers 9 feet long, 1 foot in diameter, spotted on the under side where they are to rest on the blocks, and cut down six inches deep in a notch 15 inches wider above the blocks, where they are to receive the string-pieces. These are placed across the road from block to block, each end extending outside of the blocks upwards of one foot.

3d. String-pieces from 18 to 24 inches in diameter, and either twenty or thirty feet in length. These must be squared at each end—one foot square—and at each intermediate ten feet, where they are to rest upon the cross timbers above the blocks, and parallel with each other, in two lines lengthwise of the road. They must be well hewed on the upper side, and firmly keyed into the cross timbers.

4th. Scantling, 3 by 4 inches square, placed on their broadest side, must be extended along the top of both lines of string-pieces, parallel with each other.

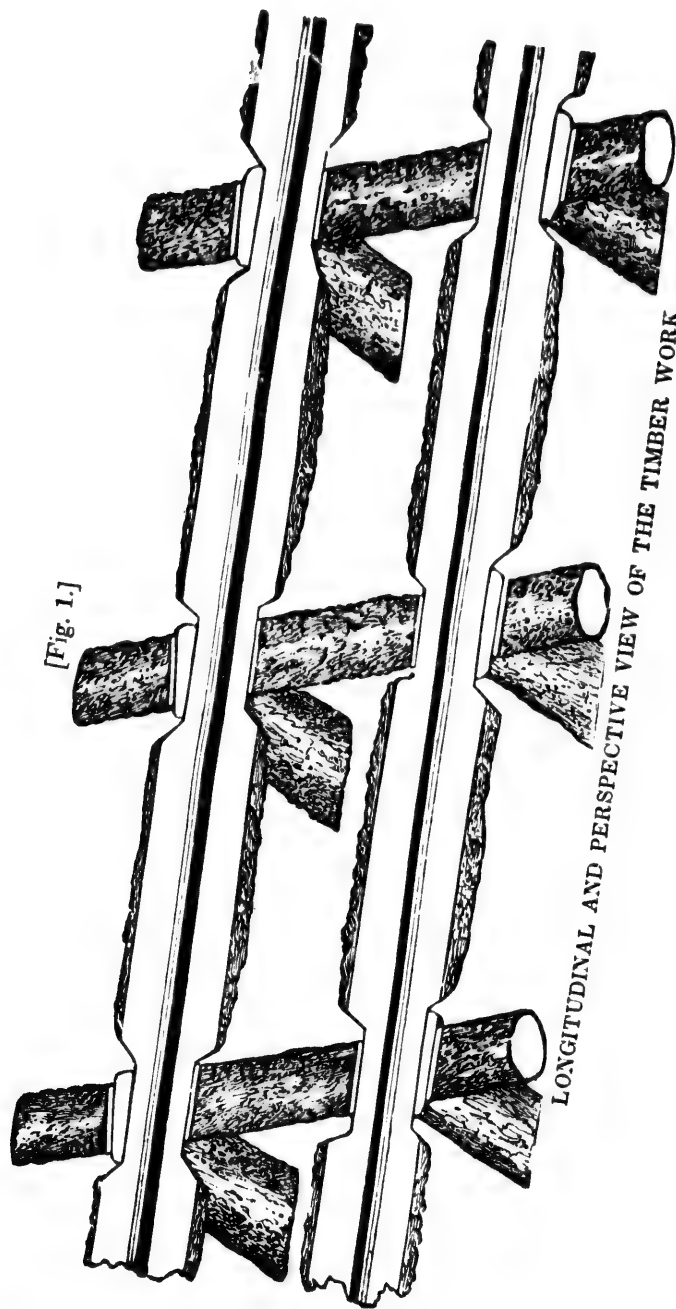
5th. Above the scantling, in exact parallelism, are to be placed two ranges of iron bars five or six eighths of an inch in thickness, and two and a quarter inches wide; and then the iron bars and scantling are firmly secured to the string-pieces, by spikes 7 inches long, driven through them both, into the string pieces.

After the road is located, and the grade line established, the timber work is completed, on all parts of it requiring embankment, and not subject to cutting of more than two feet in depth. A kind of working car is then used of simple construction, with four, six or eight wheels, having either of them four boxes, so contrived as to discharge half their contents between the two lines of string-pieces, and half without them, and carrying a cubic yard of earth to each wheel, and thus the embankment is made. Where the cutting is deeper, these cars advance one or two hundred feet, on temporary ways, being moved by horse power, and as the excavation proceeds, the permanent timbers are duly placed and secured, and the road completed. The timber work is all covered by earth within the grade to the surface of the iron, except room for the flange of the wheel. Any kind of timber may be used, for the blocks and cross timbers; the string pieces should be made of the best timber afforded by the line of road or the adjacent forest.

[See Fig. 1.]

The earth for embankments, and in excavations, stone and lime culverts, sawed scantling, iron, &c., are all moved on the line by cars.

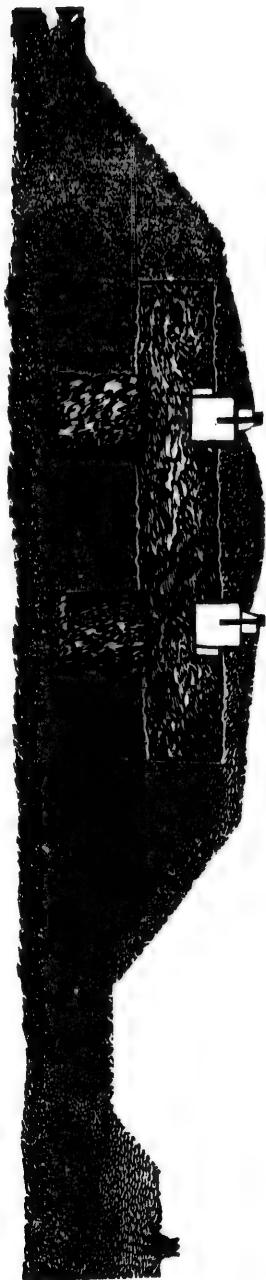
[See Fig. 2.]



[Fig. 1.]

LONGITUDINAL AND PERSPECTIVE VIEW OF THE TIMBER WORK.

[Fig. 2.]



CROSS SECTION AND VIEW OF THE TIMBER WORK IN THE GRADE.

AND PERSPECTIVE VIEW OF THE TIMBER WORK.



Men of much experience in constructing public works, particularly Rail Roads, have sought with much anxiety for some better means of applying the necessary labor, than that afforded by placing it under contract. This means has always made it difficult to secure fidelity in the work, and leads to innumerable controversies and delays in the progress of contracts, and in their final settlement. A method of proceeding, in the construction of the Tonawanda Rail Road, has been adopted, which avoids those evil almost wholly. An active practical Superintendent, with a party of 12 or 15 hands, takes charge of the timber work upon a given section of the road. This Superintendent hires and discharges his hands at pleasure. He subsists, pays, and directs their labor, keeps a weekly work list, and is responsible for the industry, fidelity, and economy of the whole. Where cuttings occur, a car of suitable dimensions for the particular work, with a horse, is placed upon the timber work, under a Superintendent and similar regulations. All these parties act in the spirit of an animated competition with each other, and each is proud of having made good progress, during the week, as per estimate of his work, by the resident Engineer.

In the first organization of the Company, the Directors appoint an Engineer, Commissioner and Executive Committee. The Commissioner is chiefly responsible for the construction of the work, in all its parts.

The office of a Commissioner, is one of exceeding interest. On his talents, industry, personal vigilance and example, the activity, economy and progress of every department of action, will very much depend. To much knowledge of the local business and resources of the country, through which the road is to pass, he should add the benefits of experience in conducting labor; and should think it no hardship to exert his energies, most of the time, in person, and on foot, to advance the various labors on the line and secure fidelity in all.

In building the road—the more artificial structures—and all the scientific details, he is directed by the Engineer. He receives the money to be disbursed from the Treasurer, and accounts, monthly, to the Executive Committee for its faithful application.

With the aid of the Engineer, he selects the Superintendents, and once a week, on Friday or Saturday, inspects their work lists, examines into their progress, and leaves the amount earned to be paid to all the hands at the week's end. On Monday or Tuesday, of each week, the Commissioner calls upon the Superintendent for the work list and vouchers, ascertains whether the hands have been duly paid, and prepares himself for his monthly settlements. Upon this plan, fidelity, industry and economy, have been well secured in all the departments of action. A similar system is adopted in the economy of traction, in the building of the road, as exists after completed. The iron and freight car wheels, should be ordered and on hand at the commencement of the work; and the first month of operating upon the plan above mentioned, will bring into actual and perfect use several divisions of a Rail Road. These divisions are usually those in which there is no deep cutting. In a month or two more, where the cuttings between them are removed, these divisions of the road may be connected by the completion of the road, at the points of their separation, and thus, in a short time, a considerable length of line may be prepared to gratify curiosity or accommodate the business of those who are interested; and what is more important, needful supplies may be taken out, and easy connexion kept up with the more remote working parties. With proper exertions, the first season may witness the application of horse or steam power to the carriage of passengers and property along a considerable extent of the road; thus early securing more or less returns of interest on the capital expended. When it is not convenient or practicable to have the iron, at the commencement of a work, wooden ribbons or scantling, 2 by 4 inches, are used temporarily, secured by spikes; the best timber for that purpose is sugar maple or red beach.

In all concerns requiring vast amount of labor, the more simple the plan upon which it is applied, and the more direct and strict the responsibility of all persons employed in it, the better it is for the stockholders. The plan above detailed, secures these advantages, while it avoids the evils of large col-

lections of men, some of whom may be prone to turbulence, and makes it easy to preserve order and harmony. The Superintendents feel the importance of the confidence reposed in them, and are ambitious to exercise their best discretion to ensure a creditable economy. The provision by which the payments are made through the Commissioner to the Superintendents, and through them to the hands, secures a control to these agents of the utmost importance to the judicious conduct of the work, without which their responsibility would be comparatively nugatory, and the ultimate expense would be considerably augmented.

The ordinary mode of constructing wooden roads, is to lay two parallel ranges of sills or string-pieces lengthwise of the road, six inches by six inches square, or four inches by six or eight square, or plank two or three inches by nine or twelve inches sawed timber, with cross-pieces laid at right angles with those placed from three to five feet apart, eight feet long, and five or six inches by eight inches square; the rails, on which the iron rests, being six inches square, or five by seven inches, and the iron consisting of bars, five-eighths or three-fourths of an inch by two and one-fourth inches wide. All this structure is placed upon the surface of the grade and filled with earth between the ranges of sills so as partially to cover the cross-pieces for a horse path. On some roads, the wooden rail has been secured by chains or castings to stone blocks placed in deep beds of rubble or pounded stone.

The more expensive and substantial roads of stone and iron are of various forms. The edge rail resting in chairs or stone blocks of various patterns, is used in some cases; and in others, the T rail resting on cross-timbers bedded even with the surface of the grade, and placed three feet apart with splitting chains; and in other cases still, the T rail resting upon stone blocks, or in place of cross-timbers, split stone seven feet long, about one foot square, resting on a bed of stone eighteen inches in depth, the whole width of the track. The expense of constructing these several forms of road, varies from fifteen to fifty thousand dollars per mile.

The expense of these forms of Rail Roads, constitutes a

fatal objection to their adoption in new districts of country ; and they ought not to be adopted if capital were ever so abundant.

1st. Experience has shown that sawed timber roads are objectionable when applied to soils of secondary formation, because the timber work has not sufficient bearing surface to resist the action of rains, which settle them into the grade ; and they cannot sustain the pressure of locomotives with heavy trains.

2d. The timber work is placed in the most exposed situation possible, and the form of preparing and placing the cross timbers subjects them to the most rapid decay.

3d. The timber is too light, yielding under the weight of the engine. This yielding and the settling together of the joints formed by the cross timbers in horizontal sections of road offer an obstruction to the passage of wheels equal to a slight ascending grade.

4th. In a northern climate, the winter frosts produce great injury on all such roads. The cross timbers being covered with earth, when this earth freezes, (which is the most exposed part of the surface) the cross timbers are raised from the sills, and thus a derangement begins, which spreads and becomes considerable every year, especially in winters of great severity.

As those evils disclosed themselves to my observation, it became a great object to contrive the means of avoiding them and introducing improvements combining durability, strength and economy. These are requisites of especial importance in new districts ; and difficult of attainment, in soils, rich and deep, and liable to hard frosts. They result, in an eminent degree, from the construction which I have recommended. That method finds most of the materials on the spot, in the heavy forests which encumber the soil, and which may be brought into, and constitute, a principal part of the structure, at an expense scarcely greater than would be incurred by removing it out of the way. This very valuable feature, in my plan, adapts it, most happily, to woody districts, where upon the old methods, the timber could not be sawed and de-

livered without exorbitant cost; and where there is timber standing, within the limits to be cleared, sufficient to answer all the demands for that article. Using large timber, in its roughest form, saves the great labor of scoring and hewing; it gives unyielding firmness to the frame work in the grade and provides ample strength for the transit of any amount of tonnage. The size of the timber, and covering it, (except the top of the scantling) with earth, secured its soundness for a great length of time. My examinations of timber, in similar situations, convinces me, that in close or clayey soils, it will endure from thirty to fifty years, except the scantling, which is but little expensive, and may be easily replaced when it decays. Placing the timber work so entirely under the grade, secures it effectually against the frost, as has been fully tested, by two severe winters, on the Tonawanda Rail Road. The blocks on which the upper timber work rests, are a substitute for stone blocks. They are so covered as to be durable, and so situated as to increase the strength and steadiness of the cross and longitudinal timbers, amply shoring up the superstructure, in any description of soils, and under any pressure from above; which secures the road for use while the embankments are acquiring solidity.

The scantling and iron plate incorporated with the large string-pieces by strong spikes, throughout their entire length, have a bearing which will not permit them to settle, at all, from the grade line before or under the wheels of the Engine, thus leaving the locomotive its utmost power of traction, and compared with stone and iron roads has that medium of elasticity most favorable to the durability of the Engine and cars. Experience has shown that the great difficulty of keeping in exact adjustment the several parts composing a stone and iron road, creates a serious tax annually, in the destruction and wear of its machinery.

This plan of construction materially reduces the time and expenses of the Engineer department. The line is first located by transit centres, or tangent lines, and benches placed, by the test level. This prepares the way for the timber work. This being completed, the Resident Engineer gives the levels

upon the cross timbers, and transfers the points of curvature from the tangents, preserving the monuments on the straight lines, and directing the several grading parties to form their slopes, as they proceed with the excavations and embankments.

It avoids the tedious detail of staking out the work for the contractor, or superintendent, replacing from time to time the stakes lost by the cutting, grubbing, embankments, &c., and requiring all to be surveyed and staked anew, when the timber or stone work, in the ordinary mode, is ready to be placed upon the grade.

The expense of a Rail Road, is made up of many different items of labor and materials combined in many different ways, and comprising foreign and local or domestic supplies; it necessarily involves a multiplicity of details. Whatever simplifies these, and increases the actual responsibility of those having charge of them, contributes essentially to economy. Practical men know this can scarcely be too much insisted upon.

In the ordinary mode of constructing a Rail Road too much time is lost from the inexperience of Directors, in determining upon local interests. The first year is occupied in preliminary and final surveys. Then commences the work of grading, occupying another year, and requiring the following winter and spring to give time for embankments to settle. A third season is demanded for putting down the timber or stone work. From defects in various parts of the work, particularly in embankments, and their connection with the non-mechanical parts, the next year embraces large disbursements for repairs. The salaries of agents, the pay of laborers, the interest on capital expended, and the cost of repairs for so long a time before the road begins to be productive, operates unfavorably upon the stock, discourages individuals from embarking a second time in such enterprises, and produces the worst effects upon the whole policy of internal improvements. Any method which requires going over the line of construction several times for the completion of it, leads to unnecessary expense, and ought to be rejected as needless. The plan here-

in proposed avoids such needless expense, and besides its economy in the item already referred to, saves nine-tenths of the horse power, indispensable in other processes, with all the inconvenience and cost of forage and accommodations, which is always extremely burdensome in woody districts.

The expense of constructing the timber work ready to receive the iron and grading, where the surface of the country nearly conforms with the grade line, may perhaps be best illustrated by the following divisions into particulars. In this case, the grade line would be raised two feet above the surface; and require the standing trees to be cut nearly even with the surface, the width of the road bed; which on the surface would be 21 feet; the large trees standing in the side ditches must be grubbed; and those outside of the ditches cut down the usual height of stumps—occupying in the road bed, the ditches, and the chopping, on both sides, a width of 100 feet. A mile of road will require 1056 blocks two feet in length and 18 to 24 inches in diameter, and 10,560 feet of string pieces, lineal measure, 18 to 24 inches in diameter, and in pieces 20 or 30 feet long each. All timber in the line not wanted for the above specifications must be placed outside of the ditches. To complete the timber work, on a mile of road of this description, within one month, allowing 24 working days, will require the services of the following persons, who will live together in a shantee, on the line, and find all their provisions, cattle forage and implements, to wit:

One Superintendent to be allowed full time, 26 days, at 12s.	\$39
One Principal Hewer, 24 days, at 12s.	36
One Assistant, 24 days, at 10s.	30
One Adzman, 24 days, at 10s.	30
One team with two yoke of Oxen, 24 days, at 20s.	60
15 Axe and Sawmen, 24 days, at 8s.	320

Total expense, \$515

Such is the amount of labor, and cost of preparing the timber, to receive the sawed scantling and the iron involving an expense for mechanical labor of only \$96. I have witnessed the execution of such a work at a much less cost per mile, excepting the mechanical part. To illustrate comparatively the expense of such a process, the following is introduced. A mile of road 100 feet in width, would in area contain $12\frac{12}{100}$ acres,

which to clear and fence, and prepare for a crop, at \$20 per acre, would cost the farmer \$242,40, which would be but little less than one half of the expense estimated to slash, clear away and prepare the timber in the form proposed.

To prepare the grading for this mile, the road bed being 14 feet wide, and the earth having a slope one and a half foot base to a foot rise, and covering the timber to the upper surface, requires the excavation of ditches $2\frac{1}{2}$ feet deep, $2\frac{1}{2}$ feet wide at bottom and 10 feet wide at top, with a slope as above, and containing 6111 cubic yards of earth, which at 10 cents per yard, amounts to

\$611 10

Add to this the cost of the timber work as above

515 00

And the aggregate is \$1126 10

The experience that has been had upon the Tonawanda Rail Road, requires a change in the mode of placing the timber in the cuttings, which has been to trench in the timber work, *without blocks*. In the process of grading, before the drainage is completed, this mode, with loads of ten tons, leads to a derangement of the timber work, in wet weather, before the permanent rail and iron are brought to the aid of the superstructure. Blocks of one foot in length should be used in the cuttings, and the whole road confined to the same description of support.

The drainage of the road is effected from within the rail, at each 100 feet, by holes bored or notched in the scantling, and directed to the ditch.

The adjustment of the road, whenever necessary, from any defect in the superstructure, is effected by uncovering the joint and raising it to its place by wedges; no ordinary adjustments are required; the iron remains in as perfect a line as when put down with instrumental exactness, and without any derangements by severe frosts.

In grading the Tonawanda Rail Road by the use of the road and cars, (which has involved the removal of more than one million of yards of earth in 32 miles of road) experience justifies the assertion that it has been performed at one half the expense required to do it, in the ordinary mode and by contract. The

distance that earth has been moved, in many cases and at all seasons of the year, if other methods had been adopted, would have postponed the accomplishment of the work, or required an unfavorable change of the grade line, which would have been an annual tax upon the company forever.

The plans adopted and the modes of executing the work are new in all their details, and were undertaken and executed by local capital supplied by intelligent practical business men. The course adopted by the Engineer in such a case is one of great responsibility and anxiety, in departing from the usual precedents. It was however justified, because necessity compelled the adoption of some plan of less expense, which should at the same time serve as an adequate substitute for the more expensive and permanent roads.

The duties assigned the Commissioner may be considered by professional men as interfering with the rights and usages of the Engineer department. This however should be viewed by them in no unfavorable light. Nothing can be more burdensome to a man engaged in difficult scientific processes and decisions, than the necessary details of financial responsibilities, and the constantly recurring cares of regulating all the minutia of labor as applied to works of complicated character. Cares of the latter description are especially onerous, when the Engineer is a stranger to the population, resources, habits of business, value of property, and most efficient means of applying whatever he may find on the spot, to the accomplishment of important operations, and such strangers all Engineers in new countries must necessarily be, in general.

The Commissioner will naturally be, and it is of great importance that he should be, either directly or indirectly interested in the public work, which constitutes the object of his appointment, and this interest will secure his vigilance and fidelity. But a man will not be found to have the requisite interest in any great improvement, and a just appreciation of that interest, who has not acquired a valuable mass of local knowledge. When such local information and interest, as a stockholder or otherwise, are found combined with habits of active industry, and much personal attention to financial economy,

and all the modes of applying power, either of men or animals, or machinery, to the advancement of laborious and expensive undertakings, then the proper qualifications of a Commissioner are manifest. A man may possess all these without being an Engineer; but not without being capable of signal service in any work of internal improvement, requiring the assistance of an Engineer, and such a man should be designated as the Commissioner.

In the plan proposed, the work will be reduced to a form so simple as to be easily understood by common mechanics and laborers. Such men, therefore, as are found filling the common employments of the country may execute all the work. Hence the number of practical operatives required by any exigencies of the undertaking, may easily be obtained.

The proceeding by day-labor, rather than by contract, is a just subject of inquiry and solicitude. The prevailing opinion, that individual contractors can manage the application of labor to greater advantage than superintendents, is undoubtedly well founded, in respect to simple excavation and embankment. But much depends upon the respective qualifications of the contractors and superintendents. Men of sense, respectability, local intelligence, and energetic industry, in either capacity, will do well. In the variety of work included in the completion of a Rail Road, upon the plan proposed, the timber work, the earth work, and the use of machinery, are so constantly and extensively combined, and it is so important, that what is difficult of execution in all this, should be done faithfully and accurately, that if contractors are employed, nearly as much cost of superintendence and vigilance will be necessary to secure accuracy and fidelity, as would be adequate to the whole task, without the use of contractors. Why not leave them out of the list of agents altogether then in such case, and thus save the considerable sums of money, which constitute the only motive to their personal exertions? Besides, contractors themselves secure their savings generally, by dividing their work into distinct portions, and employing over each, subordinate superintendents accountable to them, and thus in effect take the proper station of Commissioner, in relation to such share of the

work as may be included in their contracts respectively. In the least expensive sections of the road, contractors are least necessary. In the most expensive sections they are much less easily employed than in the works of opening a canal. In making roads, the temporary road cars, with the machinery used in their construction and application, and the horses employed in moving them, are to be provided and owned by the company. This saves nine tenths of the animal power, which would otherwise be wanted, costs more than a contractor for any given section would be willing to pay, and would not prudently be constructed, repaired, and preserved, without being subject to the entire control of trust-worthy agents of its owners.

There are other considerations which press, with great force, upon the consideration of incorporated companies, that are less applicable in practice to works under the more immediate direction of the public authorities. Both justice and expediency demand of the former that they should secure to the laborer and furnish their pay. Under the system of contracts, men seek earnestly for jobs to retrieve the results of previous misfortunes in business, or to support expensive families; and often take them for less than they can possibly be performed for. In these cases, the first receipts are liable to be diverted from the works they have undertaken. If the job is sure to be profitable, they proceed, in such cases, to its completion; if otherwise they will certainly abandon it, unless considerable increase of price is offered them, and by these means, the company is subject to all the risks of bad management and high prices. And there is no redress in any security for the performance of such contracts, which either indirectly or directly would not be found of little avail. In cases of failure to pay the laborer, he would seek remuneration from the company, and obtain it, or by clamor and the disrepute connected with great work in the details of which frauds were permitted, the company would suffer more than to pay.

The line of your road would be about three-fourths of the whole distance through timbered lands, mostly of valuable oak and pine; and in the vicinity of the improved parts of the line, the best of timber can be obtained at a small cost.

The scantling to be used for the road, I should recommend being of red cedar. There being an abundant supply on Point Pele Island, where it may be shipped to Sandwich, Chatam, Grand River, Gravelly Bay, Point Ebino, and Fort Erie where exist good harbors for vessels, from which points it could be carried out upon the line of road; or landed at other harbors requiring but little land carriage. This timber could be used with great economy, the scantling being small and of any length. It would give you a good substitute for a stone and iron road, if I am correct in my views of the durability of timber placed in the grade.

The line is divided into three divisions, Eastern, Middle, and Western, as follows, to wit:

The Eastern Division, extending from Niagara river in the town of Bertie to Black Creek in the town of Woodhouse, being 64 miles 27 chains.

The Middle Division, extending from Black Creek to the west line of the town of Oxford and west line of the Moravian Indian Reservation. This embraces that portion of the line that is on a high level above lake Erie. Length of this division, 93 miles 79 chains 85 links.

The Western Division extends from the the town of Oxford to the Detroit river at Sandwich, being 63 miles 42 chains 15 links.

Total distance 221 miles 69 chains.

ESTIMATE OF EACH DIVISION, Which are divided into sections, as follows, to wit:

EASTERN DIVISION.

SECTION No. 1. Extending from Niagara River to the west line of the town of Bertie, 11 miles 11 chains, 121,000 yds. of grading, at 6d. £3102 10 00	
Extra allowance for 1200 yds. rock excavation, 2s.	120 00 00
24 box Culverts, at £5,	120 00 00
SECTION No. 2. Extending from the west line of the town of Bertie to and including the Welland Canal, 6 miles 67 chains 9 links, 68,910 yds. grading, at 6d. £1723 15 00	
10 box Culverts, £5,	50 00 00
One Viaduct and draw Section over the the Welland Canal,	400 00 00
SECTION No. 3. Extending from the Welland Canal to the west bank of Grand River, 16 miles 17 chains 91 links, 181,550 yds. grading, at 6d. £4613 15 00	
2 box Culverts, £10,	20 00 00
5 box Culverts, £5,	30 00 00
Viaduct with a draw Section and stone abutments over Grand River,	2150 00 00
SECTION No. 4. Extending from Grand River to Black Creek, 30 miles and 11 chains, 125,999 yds. grading, at 6d., £8139 19 11	
Three Viaducts over Stoney Creek and its branches,	150 00 00
One Viaduct over Sandusky Creek,	75 00 00
One Viaduct over Nanticoke Creek,	100 00 00
Viaducts over 4 small streams, £10,	40 00 00
15 box Culverts, £5,	75 00 00
£20908 19 11	

MIDDLE DIVISION.

SECTION No. 1. Extends from Black Creek to the summit between Patterson's Creek and Big Creek, 13 miles and 34 chains, 391,093 yds., at 6 <i>d.</i> ,			£9777 06 07
Culvert at Nimecoe over Patterson's Creek,			500 00 00
Viaduct over Black Creek,			400 00 00
2 Viaducts over ravines, £125,			250 00 00
6 box Culverts, £5,			30 00 00

SECTION No. 2. Extends from the summit east of Black Creek to the summit east of the Big Otter in the town of Middleton, 13 miles 40 chains, 93,518 yds. grading at 6 <i>d.</i>			£2337 18 00
Viaduct with double track across Big Creek Valley,			7560 00 00
Viaducts across 3 ravines, £250,			750 00 00
8 box Culverts, £5,			40 00 00

SECTION No. 3. Extends from the summit in the town of Middleton to the summit west of Kettle Creek in the town of Southwold, 29 miles 45 chains and 85 links, 235,305 yds. of grading, at 6 <i>d.</i> ,			£5881 16 09
Viaduct over the Big Otter Valley,			8250 00 00
Viaduct over the Catfish Creek,			600 00 00
Viaduct over the Kettle Creek,			8500 00 00
5 Viaducts over ravines,			1025 00 00
12 large box Culverts, £10,			120 00 00

SECTION No. 4. Extends from the summit in Southwold to the east line of the town of Oxford, 37 miles and 40 chains, 307,500 yds. of grading, at 6 <i>d.</i> ,			£7687 10 00
Two Viaducts, £20,			40 00 00
11 box Culverts, at 5 to £10,			85 00 00

£53835 01 04

WESTERN DIVISION.

SECTION No. 1. Extends from the west line of the town of Oxford to Chatham, 16 miles 11 chains 57 links, 147,272 yards of grading, 6d., Viaduct over McGregor's Creek, 3 small Viaducts, at £25, 9 box Culverts, £8,		£3682 01 00
		150 00 00
		75 00 00
		72 00 00
SECTION No. 2. Extends from Chatham to the curve at the mouth of the Thames, 12 miles 39 chains 78 links, 96,282 yards of grading at 6d., One Viaduct over — Creek, 6 box Culverts, 5 to £7,		£2407 01 00
		40 00 00
		36 00 00
SECTION No. 3. Extends from the Thames curve to the end of the St. Clair tangent, 30 miles 52 chains 32 links, 240,872 yards of grading, at 6d., 8 Viaducts, at £30, 6 box Culverts, at £6,		£6021 16 00
		240 00 00
		36 00 00
SECTION No. 4. Detroit River curve, 4 miles, 18 chains, 48 links, 38,320 yards of grading, at 6d., 2 Viaducts, £20, 6 box Culverts, at £6,		£958 00 00
		40 00 00
		36 00 00
		<hr/>
		£13793 18 00

ABSTRACT.

Eastern Division	64 miles, 27 chs.,	£20908 19 11
Middle do.	93 do. 79 do. 85 links,	53835 01 04
Western do.	63 do. 42 do. 15 do.	13793 18 00

221	69	£88547 19 03
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Timber work, slashing, grubbing and clearing of 221 miles, 69 chains, at £250 pr. m.,*	£55465 12 06
Iron and splicing plates, at £450 per mile,	99838 02 06
Spike, at £50 per mile,	11093 02 06
Sawed Red Cedar scantling, £50,	11093 02 06
Laying Iron and scantling £25 per mile,	5546 11 03

Engineer Department, Commissioner, Deputy and Book-keeper,	£12500 00 00
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Workshops, Warehouses, Wharf, Carhouses, &c., Sidelings, Turnouts, Scales, Circles, &c., at eastern Depot on the Niagara River, complete,	10000 00 00
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Do. the western Depot on the Detroit river,	6000 00 00
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Station houses and branch tracks,	4000 00 00
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100 Pleasure Cars, at £200,	20000 00 00
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200 Freight Cars, at £50,	10000 00 00
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15 Locomotive and Tenders, large class,	27250 00 00
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Land for Depots, 10 acres,	500 00 00
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Damages for lands and fencing, in the present state of the improvement of the country, £50 per mile,	11093 00 08
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Total cost,	£371927 11 02
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The estimates are made at such prices as it is believed the work will cost, without adding per centage for contingencies.

* The timber work is here estimated at nearly double the cost of executing the work in a favorable section. Portions of the route would require higher blocking in some cases in embankments and deep alluvial deposits, and in others requiring the timber moved into improved grounds, open prairies, or swamps, where there is not suitable timber; also, purchase of timber which would probably increase the aggregate expense to 200% per mile. By the estimate I have allowed 20 per cent. in addition.

Grade per mile.		Length of Grade.		Asc. ft.	Des. ft.	Elev. above Lake St. Clair.		Dist. from West end of River.
Feet.	M. In. Chs.	Feet.	M. In. Chs.			Feet.	M. In. Chs.	
Level 15	4 0			30		4 30	0 0	
Level 6	10 68				3.58	30	2 00	
15	10 62				11.19	26.42	13 78	
9	36				2	12.23	21 60	
3		15				10.23	31 16	Across the Tamarack swamp to
26	72 36.12					55.23	37 16	Grand River.
15	6 90			22.50		91.35	61 08	East bank of Black Creek.
15	1 40					181.35	70 80	Highland east of Patterson erk.
10	5 40 55.0					158.85	71 18	Elevation of Cat Simcoe 114 ft
Level 8	22			15.88		213.85	77 08	Summit bet'n Pat'n & B. C.
12	2 24					197.97	81 20	Bank of Big Creek.
15	2					197.97	89 12	Summit bet'n L. & B. Otter.
15	1 40 22.50			30		221.97	91 12	Big Otter.
6	1 40					191.97	93 42	
5	3 15					211.17	95 02	
8	1					205.17	96 42	
Level 3	28			8		220.17	99 42	Summit Big Otter and Catfish.
5	3 15					212.17	100 12	
8	2 11					212.17	103 70	Swamp in T'n's'p of Malahide.
Level 2	56			17.09		227.17	106 70	Greatest height, or summit.
15	1					210.38	109 01	
11	5 15					210.38	111 60	
Level 2	36			55		225.38	112 60	Summit between Catfish and
10	2 39 21.91					170.38	117 60	Kettle Creek.
10	1 41					170.38	118 16	St. Thomas on Kettle Creek.
8	2 16			15.59		195.29	120 55	
8	1 76					170.70	122 16	
17	26			15.39		195.70	124 16	
3	6 5			40.99		180.31	126 12	
10	2			18.17		139.32	143 38	South of the Big Bend in the
7	8 61			20.00		124.15	149 13	Thames.
12	65			63.12		101.15	151 43	
7	00			15.0		39.03	160 27	
Level 12	17			19.0		21.03	173 12	
3	1 3.00					5.03	180 12	
Level 14	40 0			0		5.03	192 29	Low land south of Lake St.
3	6 18					7.13	193 29	Clair.
Level 5	60					7.13	207 69	
10	2 4					25.13	213 69	
Level 15	15			20.26		25.12	219 19	High land east of Detroit River.
						5.17	221 51	
						5.17	221 69	Wharf at Sandwich.

Whole ascent West, 409.53
 Whole descent West, 404.36
 ————5.17
 Average ascent per mile for the whole line is $1\frac{28}{100}$ feet.
 Maximum grade, 15 feet per mile, in short sections.

In a work of such great extent and expense as this Rail Road, prudence demands strict economy, not only in the location of the line, and the particular plans adopted at all points of difficulty, but also in determining which part of the work shall be first constructed. The line proposed approaches to within two miles of Dunville, on Grand River, and at Chatham at the head of steamboat navigation on the Thames. My views of pecuniary advantage to the stockholders, would suggest the propriety of making the road between these two places first. They are miles apart; and a connection, by branches, with the navigation of each of them, which would require but little expenditure, would immediately lead to a profitable use of the part completed.

The expense of the Middle Division as per	
the page 37, is	£53835 01 04
4th on of Eastern Division,	8579 19 11
1st Section of Western Division,	3979 01 00
140 m. 2 chs., 42 lks., of Iron, scantling, &c.,	115589 16 00
The necessary proportional expense for this	
part of the route for Engineer Department,	
Commissioner, Cars, Locomotives, Sta-	
tion Houses and Depots, may be estimated	
at	66274 00 00

£248257 18 03

The point of intersecting Grand River is at a good harbor, on Lake Erie, and will enjoy all the advantages of navigating that lake; a useful connexion will be opened, to the descending navigation of Grand River, to the navigation of the Niagara river at Chippawa and Lake Ontario, through the Welland Canal. These navigations would be particularly beneficial during those considerable portions of the year, when the fall storms render the open lake most dangerous, and spring accumulations of ice render all navigation to its eastern end impracticable. From Chatham down the Thames, to all places from Lake Huron to Sandusky Bay on Lake Erie, a steamboat navigation can be enjoyed for as great a period, when the ordinary lake navigation is most difficult.

In two years this section may be well finished, and its use would bring in receipts to the company sufficient to enable the

dividends to meet the calls requisite to the completion of the whole undertaking; while practical experience would be acquired, of considerable value towards the most economical accomplishment of the residue of the work, and time would be afforded for the happiest arrangement of the terminating points and other lateral connexions.

The peculiar circumstances of the line, admit the extension of the road, each way from the middle section, so as to bring into profitable use, short sections of it, as they may be successively completed. To the east it passes near Gravelly Bay and Point Ebino in the close vicinity of communicating by steamboats. To the west the line approaches near the mouth of the Thames, where there is a good harbor, and a favorable point of contact with the lake navigation north of Detroit.

This mode of proceeding would justify a commencement with much less than the whole amount of capital subscribed, affording a test of the value of the undertaking sure to be successful, and by the returns of actual investments certain to call in all the capital necessary to its completion.

By this suggestion of completing the middle section first, it is not intended to delay the completion of the work a moment beyond the time in which it can be finished most advantageously for the stockholders. The most expensive points, on the whole route, are found on the middle section, the other two being of such peculiar facility, as to place their accomplishment within a time limited only by the general benefit, pecuniary and otherwise, of the undertaking: and to be determined by a careful comparison of the grades, lines, curves, plans of construction, description of country, and general merits of the work.

Capitalists will think much of the connexion anticipated between the Rail Roads of the Province and those of the adjoining States; because on these connexions the use, and of course the profit, of them, will very much depend. And if the great lines adapted to the demands of the home population are laid out and opened, with a prudent reference to similar works set on foot, and in the way of rapid completion by the neighboring population, it is evident that the latter population

will be brought to contribute essentially to the enlargement of the annual dividends, and this contribution will be most cheerfully made, being in truth only that reasonable tribute, which good sense and justice may levy upon the natural advantages of local position.

The great length of the route—the unparalleled extent to which it is absolutely straight—the ease of the curves, where curves are required—the absence of all but very moderate grades of ascent or descent—and the practicability of passing over its entire distance between sunrise and sunset, with locomotives and heavy trains, under a very diminished pressure of the tractile power, are circumstances which could not be so extensively combined in any country but yours; and which will be equally important in your road, by the annual saving in the cost of traction and the perpetual gratifications of interest and curiosity, which they will offer to men of business and science.

It is obvious that the profits to be expected in the shape of dividends, will depend upon the outlay required to complete the work, the cost of maintaining the requisite power of traction, and the amount of business commanded by the road. All these considerations have a favorable application to your work.

Rail Road stocks have been considered more or less, in the experiments of the age, as fancy stocks. They have been sold in the markets on the credit of popular names attached to them, and often received a fictitious estimate from the exertions of individual speculation, without any proper reference to the substantial merits of the work. But the day of such results is now past. So many Rail Roads have now been made, and in so many different conditions, as to their cost and use, and value, that every thing concerning them has been subjected to the observation of multitudes of discerning individuals; and they are completely embraced within the experience of men of science. This experience proves that they unite such rapidity and facility of passage, both for travelers and commodities, that no expense of outlay can scarcely be too great to provide them on the great thoroughfares of inter-

nal communication. They are therefore the proper subjects of business calculation ; and are often undertaken, and may be well undertaken by private enterprise. In favorable situations where the original construction is cheap, the line when constructed of easy passage, and the direction such as to accommodate a great and growing intercourse, they will ensure abundant dividends, and soon reimburse the sums expended upon them.

The great field of profitable Rail Road investment must be found in lines of natural thoroughfare, in districts under a course of rapid settlement, where alluvial formations are spread into immense tracts, and where primitive mountains do not require to be cut down, and rock-bound vallies do not resist, to double or treble the amount of friction in passing frequent and abrupt curves. The great west will witness the highest and most useful power of the locomotive. There will these wonderful powers soon display themselves, upon a scale of such grandeur and utility, as find scarcely any type in the experience of the past, either in Europe or America,—a scale which can be anticipated only by the most comprehensive and intelligent views of the magnificent expanse of her rivers and lakes—her prairies and table lands.

All of which is respectfully submitted for the consideration and further order of your honorable board.

ELISHA JOHNSON,

Chief Engineer.

*Engineer's Office of the Niagara and
Detroit Rivers Rail Road Co. }
May 1, 1837.*

AN ACT

TO INCORPORATE CERTAIN PERSONS THEREIN-MENTIONED
UNDER THE NAME AND STYLE OF THE

Niagara & Detroit Rivers Rail Road Company.

WHEREAS John Baptiste Baby, Francois Baby, John Prince, Charles Elliot, Alexander Chewett, George Jasperson, John Gorrie Watson, James Dougall, John B. Langhton, Joseph Woods, John Gentle, Adam Gentle, William Elliot, Charles Baby, Thomas Paxton, Robert L. Wood, William Gaspe Hall, Benjamin Parker Cahoon, Benjamin Doughty Townsend, Edward Ermatinger, Bela Shaw, James Givens, John Bostwick, George J. Goodhue, John Redsin Woodward, and Richard Dowdle Drake, have by Petition prayed to be Incorporated as a Joint Stock Company for the purpose of constructing a Double or Single Iron or Wooden Rail Road or Way, commencing at the Niagara River in the Township of Bertie, in the District of Niagara, and extending to the River Detroit, in the Township of Sandwich, in the Western District: *And Whereas*, it is expedient to Incorporate the said Petitioners for the purposes hereinbefore mentioned: *Be it therefore enacted* by the King's Most Excellent Majesty, by and with the advice and consent of the Legislative Council and Assembly of the Province of Upper Canada, constituted and assembled by virtue of and under the authority of an Act passed in the Parliament of Great Britain, entitled, "An Act to repeal certain parts of an Act passed in the fourteenth year of His Majesty's Reign, entitled, 'An Act for making more effectual provision for the Government of the Province of Quebec, in North America, and to make further provision for the Government of the said Province,'" and by the authority of the same, That the said Jean Baptiste Baby, Francois Baby, John Prince, Charles Elliot, Alexander Chewett, George

Jaspersen, John Gorrie Watson, James Dougall, John B. Langhlon, Joseph Woods, John Gentle, Adam Gentle, William Elliot, Charles Babby, Thomas Paxton, Robert L. Wood, William Gaspe Hall, Benjamin Parker Cahoon, Benjamin Doughty Townsend, Edward Ermatinger, Bela Shaw, James Givens, John Bostwick, George J. Goodhue, John Redsin Woodward, and Richard Dowdle Drake, shall be and they are hereby appointed Commissioners, under the direction of a majority of whom subscriptions may be received to the capital stock of the Niagara and Detroit Rivers Rail Road Company, hereby incorporated, and they may cause books to be opened at such times and places as they shall direct, for the purpose of receiving subscriptions to the capital stock of the said Company, first giving reasonable notice of the times and places of taking said subscriptions.

II. *And be it further enacted by the authority aforesaid,* That the capital stock of the said Niagara and Detroit Rivers Rail Road Company shall be five hundred thousand pounds, in shares of six pounds five shillings each, and that as soon as four thousand shares of said stock shall be subscribed, the subscribers of said stock, with such other persons as shall associate with them for that purpose, their successors and assigns, shall be and they are hereby created a Body Corporate and Politic, by the name and style of the Niagara and Detroit Rivers Rail Road Company, with perpetual succession, and by that name shall be capable in law of purchasing, holding, leasing, selling, and conveying estates, either real, personal, or mixed, so far as the same may be necessary for the purposes hereinafter mentioned, and no further, and in their Corporate names may sue and be sued; and may have a Common Seal which they may alter and renew at pleasure, and shall have and enjoy and may exercise all powers, rights, and privileges which appertain to Corporate Bodies, for the purposes mentioned in this Act: *Provided always,* that nothing herein contained shall extend to authorise the said Company to carry on the business of Banking.

III. *And be it further enacted by the authority aforesaid,* That the said Niagara Rivers Rail Road Company shall have

full power and authority to explore the Country lying between the River Niagara, in the Township of Bertie, in the Niagara District, and the River Detroit, in the Township of Sandwich, in the Western District, and designate and establish, and for the said Company to take, appropriate, have and hold, to and for the use of them and their successors, the line and boundaries of a Double or Single Rail Road, with their necessary Rail Ways, to connect the River Niagara, in the Township of Bertie, in the Niagara District, and the River Detroit, in the Township of Sandwich, in the Western District; and for the purposes aforesaid the said Company and their agents, servants and workmen are hereby authorised and empowered to enter into and upon the lands and grounds of or belonging to the King's Majesty, his Heirs or Successors, or to any other person or persons, Bodies Politic or Corporate; and to survey and take levels of the same or any part thereof, and to set out and ascertain such parts thereof as they shall think necessary and proper for making the said Double or Single Rail Road, and all such matters and conveniences as they may think proper and necessary for making, effecting, preserving, improving, completing, and using on the said intended Rail Road; and to fell and cut down all timber or trees standing or being within one hundred and fifty feet on each side of said line of Rail Road; and also to make, build, erect, and set up in and upon the route of the said Rail Road, or upon the land adjoining or near the same, all such works, Ways, Roads, and conveniences as the said Company shall think requisite and convenient for the purposes of the said Rail Road; and also from time to time to alter, repair, amend, widen, or enlarge the same or any of the conveniences above mentioned, as well as for the carrying or conveying goods, commodities, timber, or other things to and upon the said Rail Road, as for carrying or conveying all manner of materials necessary for making, erecting, furnishing, altering, repairing, amending, widening, or enlarging the works of or belonging to the said Rail Road; and also to place, lay, work and manufacture the said materials on the ground near to the place or places where the said works or any of them are or shall be intended to be made,

erected, repaired, or done, and to build and construct the several works and erections belonging thereto; and also to make, repair, maintain, and alter any fences or passages under or through the said Rail Road, or which shall communicate therewith; and to construct, erect, and keep in repair any piers, arches, or other works in and upon and across any rivers or brooks, for making, using, or maintaining and repairing the said Rail Road and side paths, and also to construct, make, and do all other matters and things which they shall think necessary and convenient for making, effecting, and preserving, improving, completing, and using the said Rail Road, in pursuance and within the true intent and meaning of this Act: they the said Company doing as little damage as possible in the execution of the several powers to them hereby granted, and making satisfaction in manner hereinafter mentioned for all damages to be sustained by the owners or occupiers of said lands, tenements, and hereditaments.

IV. *And be it further enacted by the authority aforesaid,* That the President and Directors of said Company, to be appointed as hereinafter mentioned, are hereby authorised and empowered to contract, compound, compromise, and agree with the owners or occupiers of any lands upon which they may determine to construct the said Rail Road, either by purchase of so much of the said land and privileges as they shall require for the purposes of the said Company, or for the damage which he, she, or they shall and may be entitled to receive of the said Company, in consequence of the said intended Rail Road being made and constructed in and upon his, her, or their respective lands; and if the parties cannot agree, or if the owner or owners, or any of them be a *femme covert*, under age, *non compos mentis*, or out the District in which the land or property wanted may lie, application may be made to any Justice of the Peace of such District who shall thereupon issue his warrant, under his hand and seal, directed to the Sheriff of the said District, or if the Sheriff be interested, to one of the Coroners of said District, requiring him to summons a Jury of twelve freeholders in the District, not in any way interested in the matter or related to the parties,

to meet on or near the land or property, or materials to be valued, on a day named in the said warrant, not less than five nor more than ten days after the issuing of the same, and if at the said time and place any of the persons summoned do not attend, the said Sheriff or Coroner shall immediately summon as many as may be necessary with the persons in attendance as Jurors, to furnish a pannel of twelve Jurors, and from whom each party, or his, her, or their agent or attorney, or if either be not present in person or by agent, the Sheriff or Coroner, for him, her, or them, may strike off three Jurors, and the remaining six shall sit as a Jury of Inquest of damages, and before they act as such, the Sheriff or Coroner shall administer to each of them an oath or affirmation that they will justly and impartially value the damages which the owner or owners will sustain by the use or occupation of the land, or the taking of the materials or other property required by the said Company; and the said Jury shall reduce their inquisition to writing, and shall sign and seal the same, and two originals of such inquisition shall be made and executed on the same day, one of which shall be delivered to the said Company, and the other to the person claiming compensation; and the property taken and the boundaries of the land occupied by the said Company shall be set forth in such inquisition, and if, upon motion made in the Court of King's Bench in the Term following, the Court on hearing the parties shall find just cause for setting such inquisition or award aside, then an order may be made by the said Court for that purpose; and it shall be lawful for the person claiming compensation to proceed in the same manner as hereinbefore directed for obtaining another valuation, and the inquisition or award that may be made thereupon, shall be in like manner subject to the control of the Court of King's Bench upon a hearing of the parties: *Provided always*, that upon the money assessed as the valuation in any such investigation being paid or legally tendered to the person entitled to the same, the property so taken and valued shall immediately thereupon vest in the said Corporation as fully as if the same had been legally transferred by the owner thereof for such term of time

as the same may be required for the purposes authorised by this Act, and if the money, when tendered, should not be received, it shall nevertheless be incumbent on the said Corporation, at any time thereafter to pay the same on demand without costs; and that the Sheriff and Coroner, and Jurors to be summoned under this Act shall be entitled, for the services rendered by them, to be compensated in the same manner as is provided for similar services by the twentieth clause of an Act of the Parliament of this Province, passed in the third year of His present Majesty's reign, entitled "An Act granting to His Majesty a sum of money, to be raised by Debenture, for the improvement of the Navigation of the River St. Lawrence."

V. *And be it further enacted by the authority aforesaid,* That whenever in the construction of the said Rail Road it shall be necessary to cross or intersect any established road, it shall be the duty of the said President and Directors so to construct the said Rail Road across such established road as not to impede the passage of persons or property along the same, or when it may be necessary to construct it through the lands of any individual, it shall be their duty to provide for such individual proper wagon ways across said Rail Road from one part of his land to the other.

VI. *And be it further enacted by the authority aforesaid,* That if the said Company shall neglect to provide proper wagon ways across said Rail Road, as required by the preceding clause of this Act, it shall be lawful for any individual to sue such Company, and to recover such damages as a Jury may think him, her, or them entitled to for such neglect or refusal on the part of the said Company.

VII. *And be it further enacted by the authority aforesaid,* That if it shall be necessary for the said Rail Road Company, in the selection of the route or the construction of the said Rail Road, to be by them laid out and constructed, or any part of it to connect the same with or to cross any Rail Road, canal, dam, or bridge, made or erected by any Incorporated Company, or authorised by any law of this Province, it shall be lawful for the said President and Directors to contract with

such other Corporation for the right to cross or use such road, canal, dam, or bridge, or for the transfer of such of the Corporate or other rights and privileges of such Corporation to the said Company hereby incorporated as may be necessary in that respect, and every such other Incorporation, acting under the laws of this Province, is hereby authorised to make such contract or transfer by and through the agency of the persons authorised by the respective Acts of Incorporation to exercise their Corporate power, or by any persons who are by the law of this Province intrusted with the management and direction of such Rail Road, canal, dam, or bridge, or any of the rights or privileges aforesaid, and every contract or transfer made in pursuance of the power and authority hereby granted, when executed by the several parties under their respective Corporate seals, shall vest in the Company hereby Incorporated all such rights and privileges, and the right to use and enjoy the same, as fully as they are used and enjoyed by the said Corporation in whom they are now vested.

VIII. And be it further enacted by the authority aforesaid, That the President and Directors shall have power to purchase with the funds of the Company, and place on any Rail Road constructed by them under this Act, all machines, wagons, carriages or vehicles of any description, which they may deem necessary and proper for the purposes of transportation on said Rail Road ; and that they shall have power to charge for tolls and transportation, such sums as shall be established by the by-laws of the said Company hereby incorporated ; and it shall not be lawful for any other Company or any other person or persons to transport any passengers or merchandise or property of any description whatever, along said Road, or any part of it, without the license or permission of the President and Directors of the said Company ; and the said Rail Road, with all its improvements, works and profits, and all machinery used on said Rail Road for transportation, are hereby vested in the said Company Incorporated by this Act and their Successors forever ; and the shares of the Capital Stock of said Company shall be considered personal property ; and shall be transferable agreeably to the by-laws of said Company,

and subject to be taken in execution agreeably to such laws as are or may be hereafter in force.

IX. *And be it further enacted by the authority aforesaid,* That the President and Directors shall annually or semi-annually, make such dividend as they may deem proper, of the net profits of the resources of the said Company; deducting the necessary expenses, and they shall make the dividend among the Stockholders of the said Company in proper proportions to their respective shares.

X. *And be it further enacted by the authority aforesaid,* That if any person or persons shall wilfully, knowingly and maliciously, by any means whatever, injure, impair, or destroy any part of the Rail Road constructed by said Company under this act, or any of the necessary works, buildings or machinery of said Company, such person or persons so offending, shall each of them, for every such offence, forfeit and pay to the said Company, a sum not exceeding three times the amount of damage caused by such offence; which may be recovered in the name of said Company, by an action of debt in any Court having competent jurisdiction; and shall also be subject to an indictment, and upon conviction of such offence, shall be punished by fine and imprisonment at the discretion of the Court.

XI. *And be it further enacted by the authority aforesaid,* That so soon as a double or single iron or wooden Rail Road shall be so far completed, for the distance of ten miles at any one place, as to be capable of being used for transportation of property or passengers, the said Company shall have full power and authority to ask for, demand and receive, recover and take, the tolls or dues to and for their own proper use and benefit, on all goods, merchandise and passengers using or occupying the said Rail Road or any other convenience, erection or improvement built, occupied or owned by the said Company, to be used therewith; and shall have power to regulate the time and manner in which goods and passengers shall be transported, taken and carried, on the same; as well as the manner of collecting all tolls and dues on account of transportation and carriage; and shall have full power to

erect and maintain such toll houses and other buildings for the accommodation and proper transaction of their business as to them may seem necessary.

XII. *And be it further enacted by the authority aforesaid,* That whenever it shall be necessary for the construction of their single or double Rail Road, to intersect or cross any stream of water or water course lying on the route of the said Rail Road, between the river Niagara in the Township of Bertie, in the Niagara District, and the river Detroit in the Township of Sandwich, in the Western District, it shall and may be lawful for the Company to construct their double or single Rail Road across or upon the same: *Provided*, that the said Company shall restore the stream or water course thus intersected or crossed, to its former state, or in a sufficient manner not to impair its usefulness; and shall, moreover, erect and maintain, during the continuance of the Company, sufficient fences upon the line of the route of the double or single Rail Road.

XIII. *And be it further enacted by the authority aforesaid,* That it shall and may be lawful for the President and Directors of the said Company from time to time to fix, regulate and receive, the tolls and charges to be received for transportation of property or persons on said double or single Rail Road as aforesaid hereby authorised to be constructed, erected, built, made and used.

XIV. *And be it further enacted by the authority aforesaid,* That so soon as a President and Directors have been appointed as hereinafter mentioned, it shall and may be lawful for them to call upon the Stockholders of the said Company, by giving thirty days notice thereof in any newspaper published in the Niagara, London and Western Districts, for an instalment of five per cent upon the stock which they or any of them shall respectively have subscribed; and that the residue of the stock subscribed by the Stockholders shall be payable by instalments in such time and in such proportions as a majority of the Stockholders at a meeting expressly convened for that purpose shall agree upon; so that no such instalment shall exceed five per cent nor become payable in less than

thirty days after the public notice in the newspaper or newspapers aforesaid: *Provided always*, that the said President and Directors shall not commence the construction of the said Rail Road until the first instalment be paid in.

XV. *And be it further enacted by the authority aforesaid*, That if any Stockholder or Stockholders as aforesaid shall refuse or neglect to pay at the time required, any such instalment or instalments as shall be lawfully required by the President and Directors as due upon any share or shares, such Stockholder or Stockholders so refusing or neglecting, shall forfeit such share or shares as aforesaid, with any amount which shall have been previously paid thereon; and that the share or shares may be sold by the said President and Directors; and the sum or sums accruing therefrom, together with the amount previously paid thereon, shall be accounted for and applied in like manner as other monies of the said Company: *Provided always*, that the purchaser or purchasers shall pay the said Company the amount of the instalment required over and above the purchase money of the share or shares so purchased by him, her or them, as aforesaid immediately after the sale, and before they shall be entitled to the certificate of such share or shares so purchased as aforesaid: *Provided always*, that thirty days notice of the sale of such forfeited share or shares shall be given in any newspaper or papers published in the Niagara, London and Western Districts; and that the instalment due may be received in redemption of any such forfeited share or shares at any time before the day appointed for the sale thereof.

XVI. *And be it further enacted by the authority aforesaid*, That the said Corporation hereby created shall have power to construct a single or double Rail Road from the river Niagara in the Township of Bertie in the Niagara District, to the river Detroit in the Township of Sandwich in the Western District; to be located under the direction of Richard Dowdle Drake, Alexander Douglass, William Elliott, Benjamin Parker Cohoon, Francis Caldwell, Francis L. Walsh, John Prince, Bela Shaw, and John Alexander Wilkinson, who are hereby appointed Commissioners for that purpose; with power to trans-

port, take and carry property and persons upon the same by the power and force of steam or of animals, or by any mechanical or other power or by any combination of such power.

XVII. And be it further enacted by the authority aforesaid, That if the said Corporation shall not within two years from the passage of this act commence the construction of said Rail Road, and shall not within ten years from the passing of this Act construct, finish and put in operation the whole of the said Rail Road; then on failure of the Company to construct the said Rail Road within the ten years time above mentioned, the rights and privileges of the said Corporation under this Act shall be null and void as to such parts of the said Rail Road as are not finished within the time limited by this Act, and to them only.

XVIII. And be it further enacted by the authority aforesaid, That whenever four thousand shares of the aforesaid Stock shall have been subscribed, if within two years after the passing of this Act the Commissioners first herein mentioned shall call a general meeting of the Stockholders at such time and place as they may appoint by giving thirty days public notice of such meeting, and at such meeting the Commissioners shall lay the subscription book before the subscribers then and there present, and thereupon the Subscribers or Stockholders who shall attend either in their own proper persons or by proxy, or a majority of them shall elect nine Directors by ballot, and the nine persons who shall have the greatest number of votes at any election, shall be Directors; and if it shall happen at any election that two or more have an equal number of votes in such manner that a greater number than nine shall by a plurality of votes appear to be chosen Directors, then the Stockholders herein before authorised to hold such election shall proceed to elect by ballot until it is determined which of the said persons so having an equal number of votes shall be Director or Directors so as to complete the whole number of nine; and the said Directors so chosen, so soon as may be after the said election shall proceed in like manner to elect by ballot one of their number to be President; a majority of whom shall be competent to manage the affairs

of the Company, and in said election and on every occasion wherein a vote of the Stockholders is to be taken, every share shall entitle the holder thereof to one vote, and every Stockholder may vote by himself or by proxy.

XIX. *And be it further enacted by the authority aforesaid,* That to continue the succession of President and Directors of said Company, nine Directors shall be chosen as herein before mentioned annually on the first Monday in June, at such place as may be appointed by the Directors; and if any vacancy shall occur by death, resignation or otherwise, of any President or Director before the year for which he shall have been elected shall have expired, a person to fill such vacant place for the residue of the year may be appointed by the Directors of said Company or a majority of them, and that the President and Directors of said Company shall hold and exercise their offices until a new election of President and Directors, and all elections which are by this Act or by the by-laws of the Company to be made on any particular day, if not made on such day may be made within thirty days thereafter.

XX. *And be it further enacted by the authority aforesaid,* That a general meeting of the Stockholders shall be held annually at the time and place appointed for the appointment of President and Directors; and a meeting may be called any time during the interval between the said annual meetings, by the President and Directors, or by the Stockholders owning not less than one fourth of the whole Stock, by giving thirty days public notice of the time and place of meeting, and when any such meeting shall be called by the Stockholders the notice shall specify the particular object of the call, and if at any such meeting thus called a majority in value of the Stockholders are not present in person or by proxy, such meeting shall be adjourned from day to day not exceeding three days without transacting any business; and if within three days Stockholders having a majority of the Stock do not attend such meeting, then the same shall be dissolved.

XXI. *And be it further enacted by the authority aforesaid,* That at the annual meetings of the Stockholders of said Company it shall be the duty of the President and Directors

of the preceding year to exhibit a clear and distinct statement of the affairs of the Company; and at any called meeting of the Stockholders a majority of those present in person or by proxy may require similar statements from the President and Directors, whose duty it shall be to furnish them when required, and at all general meetings of the Stockholders a majority in value of all the Stockholders in said Company may remove from office any President or any of the Directors of said Company and may appoint others in their stead: *Provided*, That the intention to propose such removal shall have been specified as one of the reasons for calling such meeting.

XXII. *And be it further enacted by the authority aforesaid*, That the President and Directors of the said Company before he or they act as such, shall respectively swear or affirm as the case may be, that he will well and truly discharge the duties of his office to the best of his skill and judgment.

XXIII. *And be it further enacted by the authority aforesaid*, That the President and Directors or a majority of them shall have power to appoint, contract with and determine the compensation of all such officers, Engineers, Agents or servants whomsoever as they may deem necessary for the transaction of the business of the Company, and remove them at pleasure; and the said President and Directors or a majority of them shall have power to determine the manner of adjusting and settling all accounts against the said Company, also the manner and evidence of transfers of Stock in said Company, and they shall have power to pass all by-laws which they may deem necessary for the carrying into execution all the powers vested in the Company hereby Incorporated: *Provided*, such by-laws shall not be repugnant to the laws of this Province.

XXIV. *And be it further enacted by the authority aforesaid*, That this Act shall be deemed and taken to be a Public Act; and as such shall be judicially noticed by all Judges, Justices of the Peace, and other persons without being specially pleaded.

XXV. *And be it further enacted by the authority aforesaid*, That this Act shall not be construed to give power to

the said Company to erect ways or works of any description upon or over the Grand River so as to interfere with the free use of the Navigation thereof.

XXVI. And be it further enacted by the authority aforesaid, That notwithstanding the privileges hereby conferred, the Legislature may at any time hereafter make such addition to this Act or such alteration of any of its provisions as they may think proper for affording fit protection to the public or to any person or persons, body politic or corporate, in respect of their estate, property or rights or interest therein or any advantage, privilege or convenience connected therewith or in respect to any way or right of way, public or private, that may be affected by any of the power given by this Act.

XXVII. And be it further enacted by the authority aforesaid, That if any action or suit shall be brought against any person or persons for any matter or thing done in pursuance of this Act, such action or suit shall be brought within six Calendar Months next after the fact committed, and not afterwards; and the Defendant or Defendants in such action or suit may plead the general issue only and give this Act and the special matter in evidence on the suit.

XXVIII. And be it further enacted by the authority aforesaid, That nothing in this Act contained shall extend or be construed to extend to prevent at any future period, the Hamilton and Port Dover Rail Road Company or any other Company now formed or hereafter to be formed, from establishing Lateral Branches from said Rail Road to Queenston, Niagara, Hamilton, London, Chatham, or any other place between the Township of Sandwich in the Western District, and Bertie in the Niagara Disirict.

